

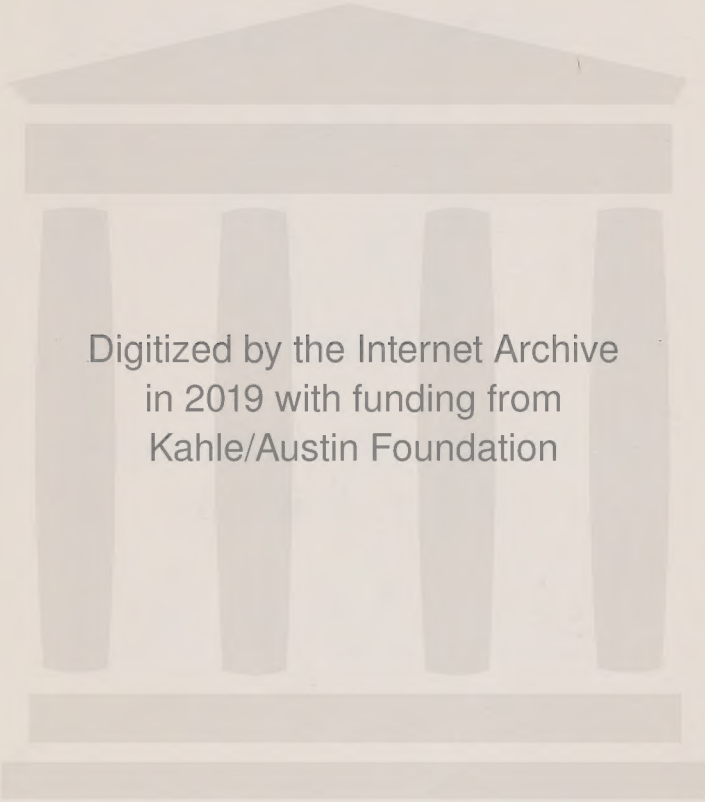
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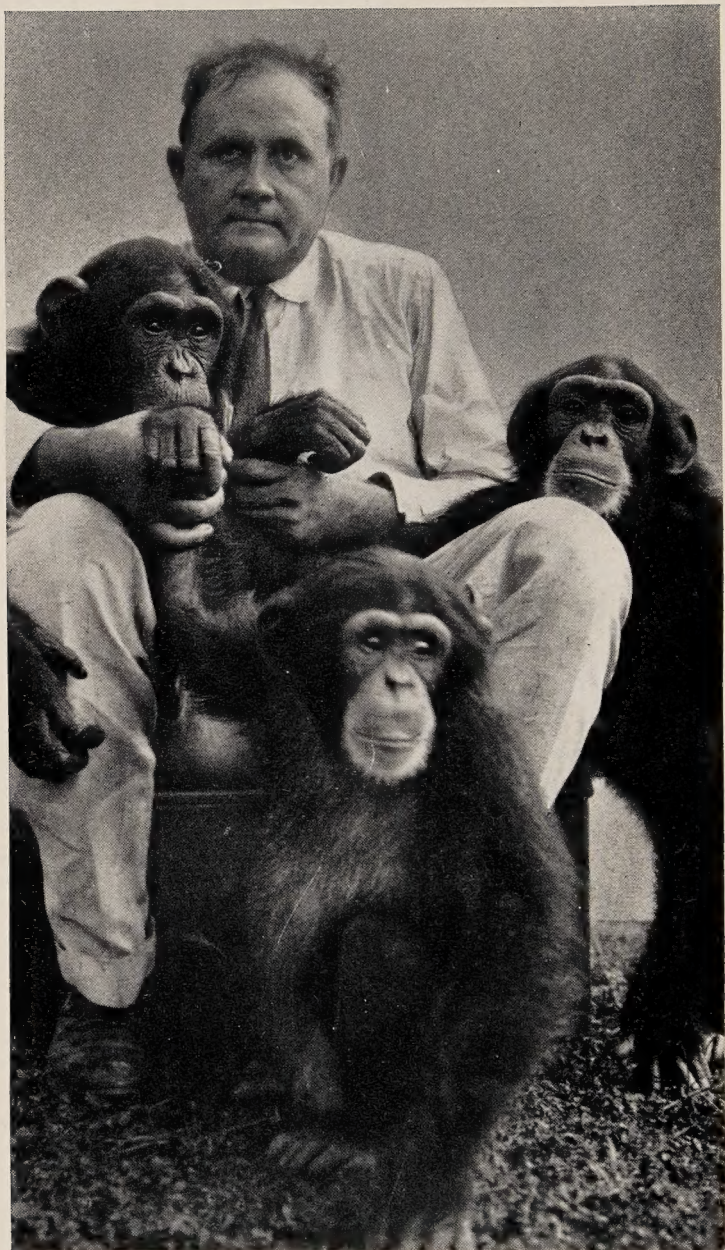
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ALMOST HUMAN



CONTENTED CHIMPANZEE CHILDREN WITH SEÑOR JUAN
LESCANO, SUPERINTENDENT, QUINTA PALATINO

ALMOST HUMAN

5.275

BY

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ILLUSTRATED



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**TO ALL WHO LOVE TRUTH AND
SEEK IT DILIGENTLY
IRRESPECTIVE OF
PERSONAL
COST**

PREFACE

This book is the product of coöperative effort; to inscribe it with a single name is on many accounts misleading. For years the writer has, metaphorically speaking, followed the trail of the anthropoid apes. The more he learns about them, the more helpful lessons for mankind he discovers in their relations to their world and to one another. Truly, as knowledge grows, wisdom, insight, and foresight increase. Yet the idea that the humble primates may be helpful to us may seem novel and surprising. Certainly such result can come about only if they are studied diligently, open-mindedly, and thoughtfully. Then indeed they may help to rid us of certain ill-founded and unprofitable prejudices and superstitions.

For loyal, efficient, and self-effacing aid in gathering information in Cuba, I am deeply obligated to Dr. Harold C. Bingham. To Miss Josephine M. Ball also hearty thanks are due. Our work at Quinta Palatino was signally advanced by Miss Irene Corey, who acted as interpreter as well as secretary. My obligation to

these co-workers is especially great because our investigations were carried on during the summer, when physical discomforts were at the maximum.

For generous permission to reproduce enlightening photographs of primates I am indebted to many friends. I make grateful acknowledgment to Dr. Bingham, who worked hard and persistently for satisfactory photographic effects; to Madam Rosalía Abreu, who kindly permitted me to select from a collection of photographs of her animals and her estate; to Mrs. Ladygin-Kohts, who has published in Russian a book on the intelligence of the chimpanzee which contains some of the best pictorial and verbal descriptions of the animal ever presented; to Professor Wolfgang Koehler, from whose accounts of his important experimental studies of the mental life of the chimpanzee many facts and several highly useful pictures have been borrowed; to Dr. William T. Hornaday, Director of the New York Zoölogical Park, for the privilege of selecting some excellent and appropriate pictures from the collection of the New York Zoölogical Society, and to the Bibliographisches Institut, publishers of Brehm's "Tierleben," and the Williams and Wilkins Company, publishers of "Chimpanzee intelligence and

its vocal expressions," for similar kind coöperation.

In the preparation of this manuscript and the handling of the several proofs I have been invaluablely assisted by my wife, Ada Watterson Yerkes, and my secretary, Mrs. Helen S. Morford. Excellent suggestions and criticisms making for intelligibility and interest have been provided, also, by Miss Margaret S. Child, Dr. H. C. Bingham, and Miss Irene Corey.

I deeply appreciate and take satisfaction in acknowledging the generous coöperation of the editors and publishers. It has made my task agreeable.

ROBERT M. YERKES.

New Haven, Connecticut
May 5, 1925.

INTRODUCTION

In the following pages are recorded the unique achievements of an exceptionally able, independent, and courageous woman who fortunately has had both the will and the means to go forward with her work as she desired. Because of the human value of her experiences in keeping primates as pets and as subjects for serious sympathetic study, this simple record has been prepared. It has been my aim to acquaint the alert and hospitably minded reader with essentially interesting facts about the monkeys and anthropoid apes and to point out, without prejudice or argument, their similarities to man and ways in which they significantly differ. In the background has been the hope that the book may help to clear away certain misunderstandings and prejudices and exhibit possible values of these creatures, our nearest of kin among living things, as objects of study and especially as means of deepening and making more highly serviceable our insight into the happenings and principles of mental life, social relations, and educational effort.

By friendly critics, who have seen this manuscript in the making, I am told that I have attempted the impossible. It is not the first time, nor, I hope, the last!

Familiarity is said to breed contempt; it often breeds respect instead. This has been true of Madam Abreu's experience in studying monkeys and apes, and of my own also. There is intense and well-nigh universal curiosity about these animals, but it is often coupled with strong dislike or repulsion. Perhaps as our ignorance disappears we shall lose also the prejudice and unreasonable dislike which makes many feel that genetic relationship with the monkeys or apes is belittling.

I first heard of Madam Rosalía Abreu when in 1915 a chimpanzee was born on her estate in Havana. The event was notable because there is no previous record of the conception and birth of one of the great apes in captivity anywhere in the Western Hemisphere. Naturally, Cuban scientists and Madam Abreu heralded the infant chimpanzee enthusiastically. Through the scientific press the news came to me. Madam Abreu was good enough, in response to my request, to send me photographs of the mother and baby and to write me about her interesting work with the primates, and of her plans.

The World War interrupted our correspondence and for several years I heard only indirectly and rarely about the Cuban chimpanzee. Then in 1923 I received from Madam Abreu a most generous and urgent invitation to visit her estate and study her large collection of animals. Through the coöperation of the Carnegie Institution of Washington I was enabled in January, 1924, to spend several days in Havana. This gave me opportunity to learn more about Madam Abreu's interest and to see her general provision and facilities for keeping the primates on her beautiful estate, Quinta Palatino.

The eagerness of Madam Abreu to have her pets used for the advancement of knowledge, and through it of human welfare, encouraged me to recommend to the Carnegie Institution that provision be made for study of the Abreu collection. The recommendation was approved and I was able with three assistants to spend several weeks in Havana during the summer of 1924, in order to observe the conditions of life and the behavior of the captive primates, and to study somewhat more intensively several aspects of social behavior and important expressions of emotional and intellectual life. Also, most of all important, I conducted a sustained interview with Madam Abreu, to obtain fairly detailed record of her long

experience with the animals and to gain insight into the relation of her traits of personality to her exceptional success in keeping and breeding her pets.

It was during this interview, which continued as opportunity was afforded through nearly two months, that the idea first came to me of trying to write a book which should make the useful experience of Madam Abreu widely available, and combine with it much general information about the primates and the possibility of greatly increasing their values to man. I discussed the plan with Madam Abreu, overcame her objections to publicity, and gained her approval. Somewhat later, as I was working on the manuscript, it occurred to me that the value of the story might be enhanced by a brief résumé of the results of scientific studies of the behavior and mental life of monkeys and apes. This it was finally decided to attempt under the three headings: intelligence, emotional life and its expressions, speech and other forms of anthropoid language. It has been impossible to do justice to the wealth of information. When words failed me or verbal description threatened to be wearisomely long, I have used illustrations. The story is the a-b-c of anthropoid life and behavior. It lacks detail, finish, completeness. If it lacks also reasonable

accuracy, orientational power, and natural interest, it will deservedly fail to command attention.

For this contribution to anthropoid literature, based almost wholly on general naturalistic observations as contrasted with those of the carefully, critically controlled laboratory sort, I have no apologies to offer. Many years of experience in the study of animal behavior have taught me that naturalistic observations and laboratory experiments have each their peculiar values. Neither alone is sufficient to our needs. Anecdotal descriptions are crude and not infrequently misleading; experimental studies often are over-refined and artificial. The descriptions in this volume are not perfect. They demand verification, refinement, supplementation. But the person, whether layman or scientist, who depends wholly on rigidly controlled laboratory studies for his knowledge of the anthropoid apes or of man is naïve indeed, and to be pitied rather than abused.

I cannot adequately thank Madam Abreu for her generosity in affording opportunity for our work, her hospitality during our many hours of labor at Quinta Palatino, and her continuous kindness and thoughtfulness for our comfort. To these any success we may have achieved is chiefly due. Her devotion to our aims and interests

almost equaled her sympathetic concern for the welfare of the animals and her desire to justify their existence in so luxurious a setting by making them useful. Although I have never sought formal approval for the statement, I am confident that she believes with us that scientific study of the primates is extraordinarily important as a means of increasing insight into the problems of life and correspondingly extending our control over it.

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ALMOST HUMAN

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CHAPTER 1

A PERSONALITY AND AN ACHIEVEMENT

REMARKABLE human achievements gain interest and meaning through intimate association with personality. Often they can be understood only in the light of the traits of the essential person. As I undertake to set down the facts which suggested the title "Almost Human," I am overtaken by the conviction that they will be colorless and for many readers almost valueless save against the background of the personality of Madam Rosalía Abreu. Therefore I have begged her permission to make this story an account of the achievements of a personality. Both she and the writer are interested primarily in the achievements, and we earnestly hope that the use of personality may in various ways enhance the value of our observations and in no manner belittle or detract from them. The task of a biographer is peculiarly difficult, and the more so when the subject is alive and extremely alert and

critical. For this reason, if there were none better, I should earnestly disavow the intention of writing a biography and plead for autobiographic assistance.

Notable achievement is usually the expression of a rare combination of personal traits. As a rule it appears in connection with vocational careers, but now and then the expressions of avocational activity command attention and admiration because of their exceptional human significance. Fortunate is he whose skill in living permits him the joy of an avocation, and extraordinarily fortunate is he whose avocation proves serviceable to himself and to others. The woman whose personality provides the materials for this story has wrought for herself an avocation which promises to be rarely valuable to mankind.

Briefly told, Madam Abreu, through her intense devotion to pets, has assembled during the last two decades a unique collection of monkeys and apes both small and great, the while discovering ways of keeping them in health and comfort, and of establishing conditions favorable to the reproduction of their kind and to their healthy growth and development. She was the first to demonstrate the possibility and practicability of breeding and rearing that great ape the chimpanzee in confinement elsewhere than in his tropical habitat.



GLIMPSE OF PRIMATE CAGES AT QUINTA PALATINO

This picture was taken from one of the towers of the residence. In the foreground appear some small monkey cages and beyond them a large ape cage



ABREU RESIDENCE, QUINTA PALATINO, HAVANA, CUBA

About the residence, but not visible in this picture, is the semicircle of primate cages

When Anumá, an infant chimpanzee, was born on the Abreu estate in Havana, he was eagerly received by scientists of the Cuban metropolis, who promptly devoted themselves to observing and describing this unexpected bit of good fortune. Anumá is now adult, a splendid specimen of his kind. Even at the age of ten years he seems gentle and affectionate, and has seriously harmed no one. His life history and genetic relations will constitute some of the most interesting and important materials of this story. But before presenting them or attempting to describe the unique collection of pets which to-day so fully occupies the time and interest of Madam Abreu, we would beg to offer the reader such facts concerning herself and her life history as are essential to the achievement of our purpose.

Rosalía Abreu and her parents are native Cubans. Her father, one of a family of seventeen children, was a man of strong personality, with exceptional business ability and devotion to his family and his vocation. He died when his daughter Rosalía was thirteen, but before that time she had learned to love and prize him, and he remains an object of her admiration and veneration to this day. His character and desires molded the child, and in important respects her life has brought to expression the admirable traits of her father. With her mother she was on somewhat

less sympathetic and intimate terms, for reasons which the following childhood incidents will serve to suggest:

“My first pet was a cat, a poor stray creature who was very unhappy. I think I was about five years old. I began by feeding and taking care of the little thing. This, I think, was the awakening of my affection for animals. My mother did not care at all for pets. She would do them no harm, but she did not like them. My father was just the opposite. During his absence on business my little cat got a fish bone in its throat. I did not know what to do and my father was not there to help, but I took the little animal and worked with its throat until I got the bone out. This was my first trying experience in caring for a pet, and I trembled with fear that I might not be able to do the work well.” Thus Madam Abreu, with few words but vividly, describes her earliest memory of caring for animals.

“My second pet was a pigeon. That was a little later. I think I must have been about seven years old. It was a young domestic pigeon that had fallen from the nest. My father told me to take care of it and not to let it die. It was very young and I fed it by putting crushed corn and rice into its mouth with my fingers. Gradually as it grew it became able to hop about. It knew me and would hop toward me when it saw me

coming. I kept it in the house and always fed it myself, so it never learned to take care of itself. In the excitement of a Cuban holiday, the sixth of January, my little pet was accidentally crushed under foot, and when I came to feed it I found it dead. I cried and cried and my father, who tried to console me, said that I would have to bury the little bird. I said I would not bury it because the worms would eat it and it would smell bad. My father asked, 'What are you going to do with it?' And I said, 'Papa, if I eat it I will have it always next to my heart.' So he said, 'Very well,' and took me to the kitchen, where I saw it dressed and cooked. Then on my father's lap, crying and crying, I ate my pet. I even wanted to swallow the bones. My mother did not interfere, for she saw that it was strong inside me."

The quality of her adored father's sympathy is indicated also by this incident which Madam Abreu reports:

"Kind people in Philadelphia, with whom father had business relations, sent him some sheep as a present. One day he happened to be passing through the keeper's house just at the moment when one of the animals was being slaughtered. He came up to the house all white and when my mother asked him what was the matter, he told her what he had seen and said that the look in the eyes of the poor animal haunted him.

Further, he said that we would have no more mutton. The rest of the sheep were sent away. He could not bear to see suffering."

Throughout her childhood Rosalía spent much of her affection on pets. Following the little dove came a Mexican dog, a humming-bird, and doubtless other charges which she either has forgotten or left unmentioned.

From birth she was strong of body and mind, active, energetic, determined. Her love for her father was a powerful influence in shaping her character and in directing her education. She went first to a day-school in Havana. Each day her father took her to school. To one of the teachers she became much attached, and when this teacher left for a better position the little girl was suspected of having arranged for her underhandedly. The principal of the school sent for the child's mother, who, after learning what had happened, reproached her. Rosalía protested that she was innocent, but nevertheless she was made to do penance for many days. Finally, she went to her father, crying and insisting that she was innocent. He then went to the school with her and told the principal that she should not be punished, because when she spoke she always told the truth.

"I will tell you how I learned English. My mother was very strict and I was mischievous.

PERSONALITY AND ACHIEVEMENT 9

When I had done something wrong she would call to my father and say, 'What shall be done with this naughty child?' Then my father would place me on the window-sill and give me a letter from his bankers, written in English, to translate into Spanish as a penance. But when I was with him nothing was a penance.'

The child's education was continued later at the Sacred Heart Convent in Havana where she studied for between one and two years. Then came the death of her father. Her mother decided to go to New York after this, and Rosalía, who again wished to go to a Sacred Heart School, was sent to "Edenhall" at Torresdale, Pennsylvania. Here she came to love devotedly Mother Aiken. So strong was this bond of affection that when her mother decided to leave the United States for France, the child refused to go until forced by Mother Aiken to obey.

"So," reports Madam Abreu, "I went to France and, when I was supposed to be riding in the park, I stole away to the Sacred Heart School there and engaged a room. When I returned and my mother asked me about the ride, I told her what I had done and that I wanted to stay at school and study. I must have been about fifteen years old at the time. My mother let me stay for about a year. Then we went to Spain for a trip, and my school education ended."

All of the institutions which shared in the training of the child were religious. Spanish was her native tongue, but French and English she learned at her father's knee and while in the United States. Later, in France, she mastered the French language.

This incident, indicative alike of the religious character of her formal education and of the strength of her personal bonds, Madam Abreu tells reverently:

“After I had children of my own, I wished to send my girls also to be with my dear Mother Aiken. She had then gone to St. Louis and there I sent one of my children. Later when I went to visit my child, I learned that Mother Aiken had died, so I asked the nuns where I could find her grave, and they directed me to the cemetery where the nuns of the Sacred Heart are buried. I went to the gate, but could find no one to guide me, so with a companion I walked in and began a search for the grave, on which I wanted to place a bouquet of lilies. We could not find where the Sacred Heart nuns were buried. Finally my friend said, ‘It is six o’clock and we shall be closed in the cemetery all night. You must leave the flowers and come.’ But I could not bear to give up the search, so I went running up a little hill where there were rows and rows of crosses. Before the first cross on the top of the hill I knelt

down, saying, 'Here is a cross; I will leave my flowers.' I raised my eyes and read 'Roberta A. Aiken,' and I said, 'God has guided me.' "

Material resources entail responsibilities. The life of Madam Abreu has been filled with them and with adventures which have tested her courage, determination, resourcefulness, and devotion. Extremely fortunate in many respects, she also has suffered misfortunes which would have crushed a less vigorous or a less determined personality. The mother of five children, she was fully occupied for some years in rearing them to relative independence. As their demands on her physical and mental resources gradually diminished, she very naturally turned increasingly to animal pets for intellectual and emotional satisfaction and for the joys of service. Always defenseless creatures had commanded her lively sympathy. Now she gradually came to devote herself to their shelter, protection, and comfort.

In her early thirties while sojourning in southern France, she chanced to see a little monkey which appealed to her and which she promptly bought. It was a female macaque, fully grown and healthy. Madam Abreu named it Minguita. This little primate accompanied the family on its travels and was a constant and affectionate companion to its owner. To other persons, and even to the Abreu children, she was disagreeable be-

cause jealous of the attention paid them. In commenting on this, her first adventure with a primate as pet, Madam remarks: "I bought Minguita because I loved all animals."

Thus with a monkey began the story to which chapters are daily being added, for now Madam Abreu's primate pets, including monkeys small and large, and apes, number more than seventy-five.

While visiting in Philadelphia in 1902, Madam Abreu purchased a chimpanzee of whom she reports:

"He was about five or six years old, and the brightest I have ever had. When he first saw my daughter she was wearing a little red sweater. Immediately he went to her and stayed with her."

Shortly Madam Abreu, with her daughter and two sons, embarked for Cuba. When the chimpanzee was taken into their state-room, he jumped from his box to one of the berths and his owner had her first test in the management of a type of pet large enough to be dangerous and with which she was entirely unfamiliar. It was characteristic of her that instead of calling for assistance, she stood her ground and by the simple and ingenious expedient of placing food in its box induced the chimpanzee to exchange freedom for an apple. After one is thoroughly ac-



LOOKING TOWARD CERRO (HAVANA) FROM QUINTA PALATINO
TOWER

In the foreground is the Abreu garden, with its magnificent tropical vegetation,
and beyond appears the double row of royal palms which line Palatino Road



FORMAL GARDEN OF QUINTA PALATINO PARK

This is only one of the many beautiful spots in the Park

customed to half-grown chimpanzees, it does not require much courage to handle them, but it is amazingly difficult when one for the first time faces such an animal at large. This little male, always gentle and affectionate and never known to bite any one maliciously, was named Chimpita. He was kept at Quinta Palatino for nearly ten years.

With Chimpita began a long line of great apes, including gibbons, orang-utans, and chimpanzees, to which during the last twenty years Madam Abreu has devoted herself sympathetically, untiringly, and with unique success.

Enabled by her father's eminent business success to gratify her longing for pets and her desire to improve the condition of the animals she loves, she has at various times kept at her estate many of the smaller birds and mammals, and, of larger animals, the elephant and the bear; but of all the creatures which have commanded her interest and attention the chimpanzee is her favorite. She says this is because it is the most intelligent of all the animals she has known, and is at the same time disinterestedly grateful for kindnesses shown it, sympathetic and affectionate. Many of the failings which contribute most largely to human unhappiness, misery, and destruction of life are lacking in the chimpanzee. No wonder, then, that from close association with the animals one ac-

quires sympathetic understanding and a sense of kinship which can be appreciated only as actually experienced.

Madam Abreu's life has been such as to develop and strengthen the naturally strong will, which causes her on occasion to dominate any situation. Gifted with a fine sense of humor and a keen intellect, she thoroughly appreciates the behavior of her unusual pets and the attitude of others toward her hobby. Only a person with rare independence of judgment, courage, and freedom from conventional restraints, could have followed the course which she has taken in devoting herself generously and increasingly to the care of her unique collection of primates. For, whether or not one likes the monkey kind, it is manifest that most persons are strongly prejudiced against these caricatures of human beings and would not accept them willingly as pets. The prejudice is natural enough, but happily, like many other human limitations and failings, it shortly gives place to sympathetic interest when circumstances furnish opportunity for acquaintance and familiarity with the creatures.

Although never insensible to the manifest surprise or amazement, the open or implied criticisms, and even the ridicule of her fellow countrymen, acquaintances, and friends, Madam Abreu has held to her avocation or hobby with such cour-

age and tenacity that it bids fair to become more important to her, and perhaps also to mankind, than are the primary vocations of most persons. This is not a minor expression of her personality but one of its most important products.

One scarcely could respect a person, however gifted or charming, who befriended dumb animals while ignoring the claims of humanity. To give the impression that Madam Abreu is thoughtless or neglectful of human welfare, or of the responsibility for service which her opportunities impose on her, would be grossly misleading and unjust. Persuaded of the incomparable value of educational advantages, and at the same time of the inadequacy of those now offered by the public schools of her country, Madam Abreu supports primary and manual-training schools in which many boys and girls are being instructed. In one of these educational establishments she takes peculiar pride and satisfaction. It was founded by her father and is continued by her in memory of him.

But if strength of will and independence were necessary in choosing Madam Abreu's unusual hobby, courage, ceaseless vigilance and resourcefulness have been no less necessary in dealing with the animals themselves. Most pets are neither dangerous nor fear-provoking under ordinary circumstances. This is not true of the pri-

mates. Even a small monkey is capable of inflicting serious wounds on its attendant. It may do so seemingly without cause, but as a rule there must be provocation. When it comes to intimate association with the great apes, the risks are proportionately greater, for a full-grown male chimpanzee with its powerful jaws and great strength of limb is capable of inflicting desperate injury on even the strongest man.

Knowing these facts well from sad experience and from wide knowledge of man's relations with the primates, Madam Abreu nevertheless day by day, and now habitually, faces situations which would daunt most men. The secret of her escape thus far from dangerous injury and her ability to handle her animals effectively is her fearlessness, which in turn is due to her forgetfulness of self. In any situation which touches the welfare or comfort of one of her pets, she is wholly intent upon her humane objective and utterly careless of personal discomfort or risk. Like men, the lower primates have respect for courage, and the person who acts fearlessly or courageously commands obedience, if not also affection.

Even with the combination of superb will power and indomitable courage Madam Abreu's work with the primates could not have succeeded had there not been present in preëminent degree sympathetic understanding of the animals them-

selves and disinterested affection for them. With human shortcomings she has little patience, but for the puzzling, annoying, or perverse behavior of her pets she has inexhaustible patience. Impulsive in all things, she yet deals considerately, thoughtfully, and skilfully with the problems which her animals present. Clearly the secret of friendship and intimacy of understanding is the same as between man and man or man and ape. There must always be confidence, sympathy, and affection.

CHAPTER 2

WHO IS A PRIMATE?

THE layman, although familiar with the word “primate,” may appreciate a working definition of the term which is so framed as to identify the primates and to distinguish them from other mammals.

By the naturalist Linnæus the “order” primate was established as the highest group of mammals, or animals which suckle their young. It originally included men, apes, monkeys, lemurs, and bats. Later it was decided that the bats should be considered a distinct order; and still later certain authorities decided that the lemurs and closely related forms also should be classed as a separate order, the Prosimiæ or Lemuroidea.

Still the question “Who is a primate?” remains to be answered. Although primates cannot be distinguished solely on the basis of external appearance and habits, such characteristics are at least as important as inner structures.

The primates vary in size, from the tiny tarsiers and marmosets to the gorilla and man. With the exception of certain galagos, lemurs, and mar-

mosets which produce twins or triplets, they ordinarily bring into existence only one young at a time and it in a condition of utter helplessness, so that for days, weeks, or months it requires parental attention. In general they are adapted to a warm climate and are either vegetarian or live on a mixed diet of berries, fruits, plants, insects, and other small animals. No exclusively meat-eating primate is known. With the possible exception of man, all primates have a conspicuous coating of hair or fur which varies greatly with the type or species and is adaptable to climatic conditions.

The extremities are described as arms and legs, hands and feet, instead of as legs and feet. The anterior extremities differ more or less markedly from those of other animals and even of other mammals in structural adaptation to other uses than those of locomotion. Primates walk with their feet flat on the ground, usually with the heel touching. Some of them habitually walk erect, standing on the feet, but the great majority travel with the aid of hands and feet.

Generally the creatures have five fingers and five toes, but the thumb is sometimes small or lacking. When present it is more or less opposable to the other fingers, thus rendering the hand highly serviceable in seizing, holding, and manipulating objects. Except in the case of man,

the great toe is opposable to the other toes and the foot therefore may be used also as a hand. The digits, whether toes or fingers, usually have flat nails like those of man, but in a few types of primate one or more of the digits end in a claw or a claw-like nail. The lemurs, for example, have on the second toe a long pointed claw.

The tail, which many persons think of as characteristic of monkeys, is not a mark of the primate. It may be entirely absent as in the case of the manlike apes and man himself, or it may be two or three times the length of the body as in some spider monkeys. Functionally it may be strictly ornamental, a balancing organ, or it may serve as a fifth extremity, being used habitually to grasp objects and thus to supplement the hands and feet. Some monkeys with partially naked prehensile tails use them, it is said, even in handling their food.

Most of the primates are tree-climbing and tree-living, or, as the naturalists say, arboreal in their habits. But here again the exceptions are conspicuous, for gorillas and men usually have other habits. Doubtless the presence and characteristics of the tail and the grasping power of hands and feet determine the degree of arboreal tendency.

All of the primates have teeth which differ in type and are therefore known as heterodont. Dur-

ing life there are two sets, the milk teeth and later the permanent teeth. The condition of the teeth is perhaps the best single criterion of a primate's age. The clavicle, a bone extending from the neck to the shoulder, is complete and well developed in primates; and the radius and ulna, the two long bones in the forearm, are always separate. The eyes always are well developed and surrounded by a bony orbit. In general it is safe for the layman to assume that a monkey-like animal is a primate.

Since the days of Linnæus the classification of the primates has been modified from time to time, and even now there are serious differences of opinion and no one scheme of classification is generally accepted. The following from Sonntag (1),¹ although rejected by many biologists, will as well as any serve our purposes:

ORDER PRIMATE

Suborder I	<i>Lemuroidea</i>
	Lemurs, lorises, galagos, aye-ayes, etc.
Suborder II	<i>Tarsiidea</i>
	Tarsiers
Suborder III	<i>Anthropoidea</i>

¹ At the end of the book, page 275, will be found the list of publications to which reference is made. Thus, Sonntag is number (1) in this list.

Section A	<i>Platyrrhini</i> (New World)
Family I	<i>Hapalidæ</i> Marmosets
Family II	<i>Cebidæ</i> Capuchins, howlers, squirrel, spider, and woolly monkeys, etc.
Section B	<i>Catarrhini</i>
Family I	<i>Cercopithecidæ</i> (Old World) Macaques, baboons, langurs, mangabeys, guenons, black apes, etc.
Family II	<i>Simiidæ</i> Gibbons, orang-utans, chimpanzees, goril- las.
Family III	<i>Pithecanthropidæ</i> (?) Pithecanthropus (ex- tinct)
Family IV	<i>Hominidæ</i> Man

Surprising and interesting differences between the New-World and the Old-World monkeys have been pointed out. They are most useful to the layman, or indeed to the biologist who is not an expert in matters of classification, in distinguish-

ing and identifying the different types. In the New-World monkeys the nose usually has a broad septum so that the nostrils are separated by a considerable space. The tail is prehensile and is used to grasp with, the thumb is not opposable, there are no cheek pouches, and no ischial callosities (bare patches on the rumps). By contrast the Old-World monkeys have as a rule a nose with narrow septum and closely approximated nostrils, a tail which ranges from a mere rudiment to a degree of conspicuousness approaching that of the New-World types, thumbs which may or may not be opposable, cheek pouches generally, but sometimes lacking, and ischial callosities.

Familiar to almost every reader are examples of the New-World monkeys, *Platyrrhini*, and of the Old-World monkeys, *Cercopithecidae*, as well as of the anthropoid apes or *Simiidae*. Although popularly the words monkey and ape are used interchangeably, it is usual for scientists to restrict the term monkey to anthropoids other than the lemurs and tarsiers on the one hand, and the great apes and man on the other. In harmony with this usage, the scientist reserves the term ape or anthropoid ape for the *Simiidae*—gibbon, orang-utan, chimpanzee, and gorilla.

Aside from man, the distribution of living primates is limited to tropical and subtropical areas

of South and Central America, Africa, Asia, Australia, and climatically similar islands. It is commonly stated that the monkeys and apes are adapted to warm climates, yet it is well known that certain of them are found at high altitudes, occasionally living in the region of snow. In such cases adaptation to low temperatures has occurred, in that the animal's coat is fur-like. The gorilla, which is usually associated with excessively hot and damp tropical regions, is found also on certain of the mountains of East Central Africa.

The Anthropoidea occur in great numbers and also in a great variety of types, including many families, genera, and species, in South and Central America, in Africa below the Sahara, in India, Southern China, and adjacent islands.

The distribution of the anthropoid apes, on the contrary, is definite and relatively very restricted. The various types of gibbon are found only in the Indian region, which includes portions of the Malay peninsula and certain of the islands between it and Australia. The orang-utan is found only in Borneo and Sumatra; the chimpanzee principally in equatorial Africa from the west coast to the eastern borders of the Belgian Congo. The gorilla is found only in certain restricted areas of western and central tropical Africa.

By contrast with the manlike apes, the distribu-

tion of human races is well-nigh universal. This doubtless is due chiefly to the measure of man's control of his environment, for whereas the gorilla or other ape adapts to climatic conditions chiefly by change in physical characters, man depends quite as much on modification or control of the environment itself. He alone of the primates uses fire for protection against the cold and for the preparation of foods. Some of the anthropoid apes build themselves crude shelters, but only man constructs an enduring shelter which is permanently located and may be used from generation to generation.

Still other significant differences between man and other primates are suggested by the facts of distribution. Human intelligence seems to have favored the conquering of the earth and have made possible existence in frigid, temperate, and torrid zones. Nevertheless, distribution does not vary directly with intelligence, for the monkeys, which in many respects are far inferior to the great apes in mental ability, are at once more numerous and more widely distributed; and the gorilla, which bears closest resemblance to man structurally and in many of its functions, is narrowly limited in its distribution. These facts suggest that there may be essential differences in the nature of the mental ability of different types of primate. Of them all, man alone has developed

to a highly useful degree spoken and written language. Must it then be supposed that language so favors the appearance of ideas and their use in the subjugation of environment that it has enabled man to advance, while his strong, versatile, but relatively speechless kindred have gradually lost in the struggle for existence?

Like man, the other primates can live in any part of the world if temperature, moisture, and food supply are suitably controlled. It is a well-founded assumption, however, that they may be kept most economically and safely in warm climates, where the risk of respiratory disorders is slight and there is a continuous and varied supply of fruits, vegetables, and insects.

In physique, many of the more lowly primates are caricatures of man. The resemblances are too striking to be ignored and they seem to be recognized even by certain of the monkeys and apes, which on occasion also resent them! It is an odd fact that Africa, a continent rich in relatively primitive varieties of the human species, is also the home of the highest types of anthropoid ape and of endless varieties of monkeys. Negro and chimpanzee seem to recognize in each other similarities which attract and differences which repel. The feelings of the negro are pretty generally shared by mankind, for the appearance and behavior of monkeys and apes offend while they

fascinate most of us. It is vain, however, to deny that among the primates are some of the most beautiful, graceful, intelligent, and affectionate of animals. The gibbon, when walking or moving through the trees, exhibits a perfection of poise and a delicacy of muscular coördination which are difficult to match. Almost noiselessly, with ease, it passes from branch to branch or from tree to tree, gauging distances and regulating its movements with exceeding skill.

The marmosets and squirrel monkeys, perhaps because of their diminutive size, appeal more readily to human sympathy and affection than do most of the larger monkeys or the anthropoid apes. Possibly this is due also, in part, to their seeming remoteness from the human kind. At any rate, the young of the larger forms of primate make similar appeal to our sympathies, and in them we feel less keenly the similarities which either attract or shock us. The physical characters of the monkeys which most commonly attract attention are the facial features and the structure of the extremities. To see an animal with arms and legs, hands and feet, fingers and toes even to the nails very like our own, and to note further that these parts of the body are used much as we use them and with no less skill, commands attention and causes the thoughtful observer to wonder about possible genetic relations

and the reasons for the appearance on the earth of animal types at once so similar in important respects and so widely sundered in habits of life and culture.

The ears, the mouth, lips, teeth, the nose and eyes, even the chin and forehead, of this or that type of monkey may be almost human in structure, expressive value or use, and when an animal with such physical characters walks erect and in various other ways approaches human modes of behavior, it is not surprising that the unprejudiced layman, as well as the scientific investigator, should suspect relationship in descent.

Of the mental traits and modes of action of infrahuman primates much will be said later. They are just enough like the human to make one feel uncomfortable. Under certain conditions we naturally abhor either resemblance or difference. Some persons, oddly enough, dislike the monkeys because of their intelligent behavior; others for the same reason prefer them to all other pets. But whatever the human attitude of liking or dislike, the fact remains that many of the monkeys, and all of the great apes, are very highly endowed mentally in comparison with other animals or even other mammals.

For one who reflects on what he sees, the social relations of the primates and their types of social organization have valuable lessons. Despite

their great activity, dexterity, and relatively high docility, no one of the primates, except members of his own species, has been enslaved by man. Monkeys and apes have been tamed and kept as pets, and upon occasion trained to certain useful service, as in the gathering of fruits or cocoanuts, but no primate has been truly domesticated. Doubtless this is due to their childlike instability of purpose, and the necessity for agreeable affective relations for existence in captivity. They quickly tire of either useful or useless activity and, always curious, imitative, and restless, seek new experiences.

In certain parts of the world types of monkey are to-day regarded as sacred; in others all of the infrahuman primates are abhorred and stand as the innocent objects of religious controversy. It seems strange indeed that with his varied structural and mental resources the monkey should have found almost no use in connection with human life save as a specimen in zoölogical parks, on the stage, or in the museum, to satisfy human curiosity and to provide certain bits of unrelated information. But there is now a growing interest in biological problems which the primates may help to solve. Consequently, in the future we may come to regard them rather as valuable objects of scientific study than as pets, curiosities, or inventions of the devil.

CHAPTER 3

A UNIQUE COLLECTION OF PRIMATES

FROM its modest beginning with an attractive macaque monkey, a chimpanzee, and pair of baboons, more than a score of years ago, the collection of primate pets at Quinta Palatino has increased rapidly during the last decade until it now numbers nearly four score animals. All the while Madam Abreu's sympathy and affection for the animals has increased with her knowledge of them, and she has become more intent on securing typical and intelligent specimens and on making their lives comfortable and happy. What was originally merely the satisfaction of a liking for pets, gradually has assumed more serious import and purpose, for as her knowledge of the mental and physical traits of these almost human creatures grew, she came to see many values which that knowledge might have for human guidance and enlightenment in connection with education, medicine, and the biological sciences. To-day her collection, in its altogether favorable and very beautiful setting, is unique in what it has yielded,

and is yielding, of information valuable to mankind.

Of the three principal suborders of the primates presented on page 21, the first two, the Lemuroidea and the Tarsiidea, are without representation in the Abreu collection. The third suborder, the Anthropeidea, is represented by more than a score of species of monkeys and by three of the four kinds of anthropoid ape.

In the following brief description of the monkeys at Quinta Palatino, Madam Abreu's observations and conclusions have been freely used since they are the principal excuse for the writing of this anthropoid story.¹

Perhaps in the fact that the lemurs and tarsiers are the least human of all the primates, one discovers the reason for their absence from the Abreu collection. They are diminutive creatures, more like four-footed beasts than like handed and footed creatures, usually nocturnal in their habits and therefore showing off badly in their reluctance to appear in the light of day.

Of the smallest types of monkey, the marmosets, the collection contains several specimens. Their owner is very fond of these tiny creatures and describes them as delicate, gentle, timid, and alert,

¹ The reader will find in Forbes's "Handbook of the Primates" (2) interesting descriptions of monkeys and their ways. The writer gratefully acknowledges his debt to this author.

but not very intelligent; affectionate especially among themselves and in their family relations, and occasionally showing attachment to persons who befriend them. She reports having been told by an animal-collector that when one member of a pair of marmosets dies the other, whether male or female, dies shortly afterward.

“This,” she says, “is very true. I have lost at least eight females, mostly because of difficulty in bearing young. In every case the male died within a few hours after his mate.”

This observation is worthy of verification or correction; and if verified, of further study and explanation.

The marmosets are exclusively New-World monkeys. Because of their physical traits they are classed as the lowest of the suborder *Anthropoidea*. The little creatures abound in the forests of equatorial South America. They are squirrel-like in appearance and behavior, with flattened nose, nostrils separated by a wide partition, bushy non-prehensile tail, face and ears usually almost hairless,—although in some species beautifully fringed with hair,—bright eyes, quick movements, and a chirping voice. Naturally, they make a strong appeal to lovers of pets, and except for their delicacy of constitution and difficulties in breeding in captivity they undoubtedly would be kept much more commonly.

Next in order of size to the true marmosets and the tamarins come the creatures which are popularly called night-monkeys. They also are small and dainty, with long hair, bushy tails, and attractive faces. At Quinta Palatino I found three types of night-monkeys: the squirrel monkey, the titi monkey, and the owl monkey or *douroucolis*. Madam Abreu says of squirrel monkeys: "Those from Panama are very bright. Those from Brazil are very stupid."

She considers the Panama squirrel monkeys the most intelligent of the monkeys she has known. They are as bright, she says, as the chimpanzee "but they do not think, they do not reason." Here, evidently, is a distinction in kind of intelligence. Animals may be bright, alert, in a variety of ways intelligent, yet incapable of using ideas in solving their problems. The inference suggested by Madam Abreu's characterization of the Panama monkey is that, although in some respects as intelligent as the chimpanzee, it lacks certain intellectual abilities which the great ape possesses. To the question "Have you ever seen any of the small monkeys use objects as tools?" Madam Abreu promptly answered, "No."

These suggestions as to mental characteristics of the Panama squirrel monkey may prove valuable to science as indicating a species which is especially worthy of study. In general the

squirrel monkeys are characterized as remarkably beautiful, active little animals, with soft thick fur, large eyes close set in the little face, large ears, and nose with nostrils widely separated. The tail, unlike that of the marmosets, has short hairs and ends in a tuft. They are almost exclusively arboreal and occur commonly in the American forests from Costa Rica to Brazil. Diurnal in their habits, they are said to feed largely on insects and other small animals.

Of peculiar interest in the light of Madam Abreu's observations concerning monkey intelligence is the fact that the primates' cerebral hemispheres—the portion of the brain thought to be primarily responsible for intellectual functions—project farther beyond the cerebellum than in other mammals. And whereas in the marmosets and tamarins the surface of the cerebral hemispheres is almost smooth, the inner faces of the hemispheres of the squirrel monkey exhibit marked foldings or wrinkles.

Intermediate in many respects between the squirrel monkeys as already described and the true night-monkeys, such as the *douroucolis*, is the titi monkey. It also is diminutive, with small head, soft fur, long bushy tail, small eyes, widely separated nostrils, and large ears. This little creature, like the squirrel monkeys, is diurnal and arboreal. It is exceedingly alert, lively, and

noisy. The titi monkeys are said to range over the forest regions of South America from Panama southward, living on fruits, insects, eggs, and small birds. Madam Abreu's general characterization of the squirrel monkey applies also to these creatures. They are attractive because of their appearance and alertness, but of a relatively low order of intelligence.

The last of the three types of night-monkey appearing in the collection is the little owl- or tiger-cat monkey, the douroucolis. Also of small size, it attracts attention chiefly because of its facial peculiarities. The head is rather large, the face round and encircled by a ruff of whitish fur. The mouth and chin are small, the ears very short, and the eyes enormous and of yellowish color. The name owl-monkey is eminently appropriate.

One sees little of the owl-monkeys ordinarily, as they are both nocturnal and arboreal, hiding during the day and seeking food at night. It is said that as they prowl about at night they utter cat-like cries. By the Indians of Central and South America they are called devil monkeys. They are very delicate and not likely to survive long in captivity.

All of the monkeys thus far described as in the Abreu collection are small New-World types which are found in Central or South America.

Of the larger types of New-World primate, howlers, capuchins, woolly monkeys, and spider monkeys are found in the collection.

The howlers are among the largest of the South American monkeys. They are heavily set, with pyramidal head, small facial angle, and a somewhat dog-like muzzle. Certain peculiarities in the vocal mechanism of the males enable them to make sounds which can be heard for long distances. The tail of this somewhat unprepossessing variety of monkey is strong, naked toward the tip, and prehensile. The thumb is opposable, the face naked, and the chin bearded. It is said that the howlers are of a low order of intelligence. Their characteristic roar appears to be produced with little effort and to serve to intimidate enemies.

Madam Abreu characterizes her howling monkeys as "very melancholy and delicate, but good-tempered."

With the capuchins we come upon the variety of New-World monkey which is most commonly seen in captivity. Being cheap and easy to obtain they are the customary attendants of the organ-grinder. There are scores of species and varieties, all belonging to the genus *Cebus*. They have a well-proportioned body, with woolly fur, round head, and a face which is more manlike than doglike, for there is no protruding muz-



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A WHITE-THROATED SAPAJOU MONKEY

With this New World primate we are all familiar



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A RED HOWLER MONKEY

How different is the nose from that of the chimpanzee or orang-utan

zle. The tail usually is long and completely covered with hair. Nevertheless it is prehensile and extremely useful. The brain is relatively large, and the surface of the cerebral hemispheres is much folded as in the Old-World monkeys. The capuchins range from Costa Rica to Paraguay. They differ greatly from species to species and even within a species in the lightness or darkness of the coat.

Generally speaking, the capuchin is gentle and makes a good pet. Of some of the species it is said that they are very intelligent, but Madam Abreu ranks them as ordinary by comparison with the squirrel monkey of Panama and the macaques. It is natural that any considerable collection of primates should include several representatives of the capuchin, for it is hardy and easy to keep as well as to secure in the market. No type of New-World monkey has been so much used for scientific purposes as this, yet our knowledge of its behavior and its life history remains incomplete and unreliable. It is difficult to understand why no naturalist should have set himself the task of observing continuously and attentively the social relations and individual behavior of some species of capuchin.

At the time of observation there were four capuchins at Quinta Palatino. All were interesting to visitors because of odd habits or mannerisms

which had been acquired in captivity, perhaps chiefly to attract attention, for no animal is more eager for attention than the monkey. One of the specimens was called the "washerwoman" because of her fondness for using a wet cloth to wash objects or to rub the floor. It is perhaps because of the facility with which these animals acquire certain manlike attitudes or reactions that they are so much used for exhibition purposes and by persons who, like the organ-grinder, need a hardy, good-tempered, and docile creature to attract attention and entertain.

The woolly monkey, belonging to the genus *Lagothrix*, is characterized first of all by the woolliness of its heavy coat. It has a somewhat heavier body than the capuchins and a flattened nose with nearly circular nostrils which are widely separated. In addition to being larger than the capuchin, it is slower in motion, and because of its gentle disposition and fondness for petting it is commonly found in captivity and is usually a favorite with visitors. The specimens in the Cuban collection were no exception in this respect, for they claimed their full share of the attention of both scientific observers and casual visitors.

Closely resembling, in some ways, the woolly monkey is the spider monkey, so called because of its long slender arms, relatively slender body,

somewhat projecting muzzle, and very long tail. Instead of the woolly under-fur, which characterizes the other type, it has coarse hair which is usually black. The spider monkeys were not subjects of special attention or comment in Havana and so may be supposed to rank with the other representatives of the Cebidæ as reasonably well adapted to captivity, but not of exceptional interest aside from their peculiarities of appearance.

Conspicuous for their number as well as their greater size are the Old-World monkeys of the Abreu collection. Among them are to be noted several macaques, mangabeys, baboons, mandrills, and black apes.

The macaques are notable for their intelligence, hardiness, their thick-set body and short limbs. Just as the capuchins are the commonest of the New-World monkeys, so the macaques are the commonest of monkeys in India and the East Indian Islands. There are many different kinds, with considerable variety in form and habits. At Quinta Palatino there are three which are particularly striking—the pig-tailed macaque, the lion-tailed macaque, and *Macacus rhesus*. The pig-tail is a large monkey with broad chest, short body, flattened head, a face prolonged like that of the baboon, heavy ridges above the eyes, long and powerful limbs. The

rather slender tail, which is only about one third the length of the body, is pointed, and carried in a peculiarly characteristic curved position. As in all of the Old-World monkeys, the ischial patches are bare; so, also, are the face and ears. The hair color usually is olive-brown, though it ranges from gray to blackish. Madam Abreu says the pig-tail's eyes and skin color strongly suggest those of the mongolian race. This peculiar-looking monkey is usually timid when young, but the mature male is likely to be savage. It is also extraordinarily courageous and on provocation may attack either man or beast. It occurs chiefly in Southern Burmah, the Malay peninsula, Sumatra, Java, and Borneo.

The lion-tailed macaque, *Macacus silenus*, is truly a miniature imitation of the king of beasts. It has a long, slim body with well-proportioned limbs, a slender tail which may be nearly half as long as the body and which ends in a conspicuous tuft of hair. About the face is a ruff of long hairs which conceals the ears. It is this fringe of hair and the tufted tail which, in combination with the proportions of the animal and the way it holds itself, suggest the lion or, more precisely, a caricature of the lion such as might be expected in a primate.

The lion-tailed monkeys are found in small herds in the dense forests near the Malabar

Coast. They are shy and wary and in captivity inclined to be somewhat sulky, morose, and not readily taught. It is said that the voice of the male resembles that of man.

In the Abreu collection there are three specimens of the lion-tailed monkey. All seem shy and distrustful of human visitors. They are not at all aggressive, and give the impression of stupidity rather than eager alertness and docility. This impression their owner's experience confirms. The animals are interesting in a collection primarily because of their peculiarities of form. They are not actors, and where the capuchins succeed most notably the lion monkey ignominiously fails.

Of the macaques as a group Madam Abreu says:

"They are sometimes bad, but they also are very affectionate, most of them more so than the rhesus, and they make better pets than the rhesus. They are very easy to keep and they either like or dislike you."

At this time a young *Macacus rhesus*, which is still small enough to slip between the bars of its mother's cage, roams about the grounds at will. The father of this infant is reported as a savage and disagreeable animal who, when critically ill with cancer, became very tame, docile, and apparently grateful for human attention. The

rhesus monkey, Madam Abreu thinks, deceives one as to its intelligence by its liveliness and general evidences of alertness. She admits that in some ways it is more intelligent than the South-American monkeys and also that it is of a better disposition, but she still has reservations when she compares it with other species of macaque.

Macacus rhesus is known by the Hindus as the Bandar. This Bengal macaque lives in troops of considerable size. It takes to water and swims well. The species is very quarrelsome, being much given to both fighting and screaming. Although it is not regarded as sacred, the Hindus rarely disturb the animal. When *Macacus rhesus* becomes angry, its face, which is ordinarily dark flesh-colored, becomes red. Bengal macaques are hardy, breed well in captivity, and except for their somewhat unfriendly dispositions make excellent exhibition specimens.

The monkeys which are called mangabeys, genus *Cercocebus*, are exclusively West African. On the one hand they are related to the macaques and on the other to the guenons. Their most notable physical peculiarity, from which they derive the common name white eyelid monkeys, is the white upper eyelid. The tail is as long as the body. Like their relations the macaques and guenons, the mangabeys are arboreal, living chiefly on fruit. Speaking of them, Madam

Abreu remarked that they are brighter than the gibbons. They are also more common and can be kept more readily.

Of the guenons, the green monkey, *Cercopithecus callitrichus*, was much in evidence in the Abreu collection, since there were seven individuals. The green monkey also is a native of West Africa, where it lives either alone or in small bands. It is extremely quiet, remaining silent even when attacked. It stands northern climates well and therefore is common in northern Europe, having been bred in the Zoölogical Gardens in London. During early life it is active, intelligent, gentle, and of good disposition, but like most of the primates, as it matures it becomes less tractable and it may grow savage, treacherous, and malicious.

The animal is attractive in appearance as well as manners. Its face is rather long, the ears large, naked, and somewhat pointed; the hair at the side of the head is long, thick, and frill-like; the face, ears, palms, and soles are black, the head, back, shoulders, arms, and upper part of the forearms, thighs, legs, and tail rich golden green.

Yet another interesting type represented is the mona monkey, *Cercopithecus mona*.

Decidedly interesting as a form intermediate between the Old-World monkeys which have just

been described and the baboons and mandrills is the black ape, *Cynopithecus niger*. It is also known as the celebian black baboon. The creature is rather more ape- than monkey-like. The head is oblong, the face elongated and naked, the nose triangular with sides erect, flattened behind nearly to the eyes, not extending to the end of the muzzle but leaving a broad upper lip, nostrils with a long and broad partition between them directed downward and outward. The hair or fur is long and tends to be woolly over the body. It is especially long on the back of the head, where it forms a conspicuous crest which moves with emotional changes, becoming erect when the animal is stirred to resentment or anger.

The black ape is found in Celebes and on adjacent islands. It has a fairly gentle and friendly disposition, but is not good-natured under provocation. In fact, it is surprisingly ready to show fight and in so doing it bares its teeth and moves the scalp so that the tuft of hair stands erect.

Of the two specimens of black ape at Quinta Palatino, the one a male, the other a female, only the male exhibited the crest of hair. The animals differed greatly also in size and form, the female being much heavier and showing broader face and head. In most situations the male was aggressive, alert, and appeared more in-



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A WOOLLY MONKEY

These little animals are no less interesting in behavior than in appearance



By permission of New York Zoölogical Society

GELADA BABOON AND YOUNG

The familiar attitude, often mistaken for flea-hunting, might better be called hair-dressing. It is thus the animals help to keep one another neat and clean

telligent than the female. It seems more than likely that the individuals of this pair represent either different species or different genera, and it may be that the female has been mis-identified as a black ape.

The baboons, of which a pair named Papio and Jack was purchased by Madam Abreu about twenty years ago, at first impress one as strangely unattractive primates. In facial characteristics they remind one of the dog; indeed, they are frequently called dog-faced apes. The tail in the baboons may be long, short, or virtually absent. It is never prehensile. In all of the species there are rather conspicuous hard, fleshy patches on the buttocks which, like the naked skin of the face, may be brilliantly colored.

It is said that gestation in the baboon lasts seven months and that the young are suckled for six months. The baboons are characterized as the lowest of the Old-World monkeys. Many of them are large, ferocious, gregarious animals which when disturbed or alarmed utter piercing screams, barks, or guttural murmurs.

Although confessing that she has no liking for baboons, Madam Abreu has kept them in her collection for many years and at times has had as many as half a score. When asked why she keeps so many baboons if she does not care for them, she replied, "Because they were born here, poor

things!" Then she went on to tell the following incident to illustrate the affection of the animals for one another. The original male which she purchased in Paris died a few months ago, aged about twenty years. He was very sick for some time and during this period of relative helplessness one of his children, a baby somewhat less than a year old, took care of him, making sure that he was fed, and acting, Madam Abreu says, much as a person might. "The wife and mother paid slight attention to the invalid, but the baby would not leave him. This is a very tender story."

The baboons are extremely jealous and seemingly brutal in their relations even to one another, yet their possible affective relations are well exemplified by the above incident and also by the following, which Madam Abreu recites with evident satisfaction, since it seems to exhibit certain merits in an animal which she has difficulty in admiring.

One day the baby baboon previously referred to escaped from the cage in which he and his parents were kept. This was before the father became ill. The little one was presently captured and with due precautions for the safety of the captor returned to the cage through the same hole from which he had escaped. As soon as he was dropped into the cage the father and mother

eagerly rushed to him and inspected him carefully, looking at the head, nose, eyes, mouth. When they found that he was unharmed, they seemed greatly relieved and contented. "They are stupid but they love their children."

At various times there have been in the Abreu collection chacma and gelada baboons and mandrills.

At present there are two young mandrills in the collection. These animals Madam Abreu characterizes as somewhat less stupid and less repulsive in their behavior than the baboon, but not better-natured nor more docile. In appearance the mandrill is interesting chiefly because of its facial peculiarities, for the ridges of the face are bright blue, with purple in the intervening furrows. The bridge of the nose is red with scarlet tip, the lips a grayish-black; the general color of the fur is black, fringed with yellow. The color pattern is varied and rather gaudy, and the effect unattractive. Like the baboons, mandrills may be aggressively savage when adult. These animals do not make good pets and they appear in zoölogical gardens and other collections only because of their oddities.

In size the monkeys at Havana range from the tiny marmoset to the full-grown male baboon, which is large enough to be a dangerous antagonist for a man. Intelligence also varies widely,

for that of the marmoset is of a low order, and by contrast the macaque monkeys exhibit exceptional initiative and docility. At the summit of the pyramid Madam Abreu doubtless would place the squirrel monkey of Panama, but whether her favorite would succeed in holding that place of distinction against the critical examination of his capacities by the student of behavior one may not safely predict.

There yet remain for our attention those animals which tend to monopolize the time of Madam Abreu and to fill her mind with interesting questions about the habits, life history, intellect, and emotions of the higher orders of primate. These creatures are the great apes. They are worthy of a chapter to themselves.

CHAPTER 4

A MODEL CHIMPANZEE COLONY

IF resemblance be a criterion of genetic relationship, there is abundant justification for saying that the great apes are man's nearest living relatives. The family Simiidae, to which belong the animals variously called the manlike apes, great apes, and anthropoid apes, comprises only four types. Of these the gibbon is markedly different in many respects from the orang-utan, the chimpanzee, and the gorilla. The superficial resemblance of the great apes to man was noted with their discovery, and by the earliest writers they were described as wild men or half-humans. It is now safe to say that resemblances in behavior and in several of the mental functions which have long been considered distinctively human are quite as marked as are the superficial structural resemblances which first impress the observer.

All of the anthropoid apes walk either in a semi-erect or erect position. The gibbon especially is able to walk erect with a freedom of motion and grace which are always remarked. The

orang-utan also can walk erect with ease, but more commonly places its hands on the ground, resting only a little of its weight on the knuckles. This is true also of the chimpanzee and the gorilla. The front limbs are always much longer than the hind limbs, thus giving a semi-erect attitude. All have the typical catarrhine nose with nostrils closely approximated and directed downward. Without exception they are tailless and also lack cheek pouches which are so commonly found in the monkeys. Ischial callosities are absent except among the gibbons. There is commonly a covering of hair varying in thickness and color. Except in the gibbons the spinal column shows in the sacral region a curvature like that in the human skeleton.

The brain of the manlike apes in general conformation resembles that of man. The surface of the cerebral hemispheres is much folded and its sulci are identical in arrangement with those of the human brain. It has been said that the difference between the configuration of the brain of the chimpanzee and that of man is slight by comparison with that between the chimpanzee and the lemur.

Although the anthropoid apes have long been described as arboreal animals, they are not so, strictly speaking, for they differ extremely in that the gibbons are arboreal, the gorilla a ground

form, and the orang-utan and chimpanzee intermediate, the orang-utan being much more at home and spending a larger part of its life in trees than the chimpanzee. With respect, also, to such other important matters as distribution, habitat, life history, habits, and mental endowment, the different types of anthropoid ape are radically different. Indeed, it almost seems as though the gibbons should be constituted a separate family,¹ thus leaving the orang-utan, chimpanzee, and gorilla as the three manlike apes which may be appropriately described also as great apes, for whereas gibbons do not exceed the size of some of the larger monkeys, the other apes approach or even exceed the size of man. Of the three, the gorilla reaches the largest size, the adult male in some cases weighing four or five hundred pounds. But even in the case of the orang-utan and chimpanzee, large individuals may equal or exceed the weight of man.

The most notable and surprising difference between these manlike creatures and man himself is the apes' lack of a highly developed and efficient language. Each of the types has a well-developed voice and various ways of using it, but in no instance is there systematic and elaborate use of meaningful sounds as in the case of human speech.

¹ This is done by some systematists. See Elliot (3).

At Quinta Palatino there were in July, 1924, eighteen anthropoid apes, including one Wau-Wau gibbon, *Hylobates leuciscus*; three orangutans, *Pongo pygmaeus*; and fourteen chimpanzees belonging probably to two or three different species. These creatures constitute the very heart of the collection, because they loom large in bulk and are ever present to one's vision by reason of varied and interest-compelling activities. All of the primates are eager for human attention when held in captivity as tamed creatures, and it is inevitable that the larger and more demonstrative ones should have a great advantage in competition with their smaller and less gifted relatives.

These creatures are so highly individualized and they so quickly make a place for themselves in one's world of social relations that it is entirely inadequate to describe them merely by type, or as gibbons, oranges, or chimpanzees. As a fact, and as a matter of course, each of the great apes in Madam Abreu's collection has a name to which it responds and which rapidly gains significance for the frequent visitor. Under their names the animals will now be briefly described, and at the same time attempt will be made still farther to indicate some of the chief characters of the primate types which they represent.



WAU-WAU, THE LONE FEMALE GIBBON

This silver-gray ape has a furry coat which many visitors envy her. The picture shows her just outside her cage



By permission of New York Zoölogical Society

A SIAMANG GIBBON

Jet-black, sure enough, and much less beautiful than Wau-Wau

Wau-Wau is a lone female gibbon. Being the sole representative of her group as well as of her species, she has been given the common name for the species, which seems peculiarly appropriate after one becomes familiar with her characteristic cry. She is a beautiful creature with silvery gray hair so thick and soft that it constitutes a fur coating. About her jet-black face, the features of which have many points in common with man's, is a circle of white hair which in its marked contrast with the black face is extraordinarily impressive. Her eyes are bright and intelligent-looking, and whether swinging about in her cage or walking erect, she moves with amazing ease and grace. Although it is often stated that the gibbons are rather delicate and do not long survive captivity, Wau-Wau has lived in Havana for many months and at the time of observation seemed perfectly healthy and, apart from her obvious lonesomeness, reasonably contented. Perhaps because of relatively little human attention except for feeding, care of her cage, and occasional petting, she was somewhat wild and distrustful of strangers who approached her. Altogether her actions belied her intelligent face. Madam Abreu is not particularly interested in gibbons, which she considers "lively but stupid." She likens them in intelligence to the sacred monkeys of India.

There are several species of gibbon, but none more attractive in appearance and behavior than the Wau-Wau or gray gibbon. Most of the other kinds have black fur and present so little contrast in body, face, and eye color that they are uninteresting. The names of the genus comprising the gibbons is *Hylobates*, meaning tree-walkers. Certainly no animal structurally or in performance more perfectly qualifies for this name. The gibbons have the longest arms of the primates. When they stand erect the tips of the fingers may touch the ground. The legs are much shorter. The brain has relatively small occipital lobes.

It is sometimes stated that these animals are highly intelligent, and certainly they are by comparison with many of the monkeys. They are, on the contrary, unintelligent as compared with the other anthropoid apes. Especially when young and occasionally when adult, they are gentle and affectionate pets which excel in entertaining value by their acrobatic skill. The voice is disagreeably penetrating and even in the open is an unwelcome intrusion if one is near by or if several of the animals cry in chorus.

The orang-utans of the collection have the good fortune to be three in number and to constitute a reasonably self-satisfied group. There is an adult male called Cachesita which has been resident at Quinta Palatino for about six years. He

probably is not less than ten years old, for he apparently is mature although not necessarily fully grown. With him as cage-mates and play-mates are two half-grown females, Cachita and Misuita, which came to Madam Abreu from Borneo by way of San Francisco about two years ago. A shrewd guess at the age of these animals would be six to eight years. Neither is mature although both are much larger and heavier than Wau-Wau the gibbon. These three orang-utans usually are as solemn-appearing as owls. They seem to take life with tragic seriousness. Unlike the chimpanzee, they are sparing of action, and although they occasionally indulge in play, they are relatively slow in movement, somewhat ungainly, and contrast almost ludicrously with the gibbon.

It is not easy to become intimately acquainted with the orang-utan, for, although friendly enough, he is somewhat mongolian in his social attitude and remains unobtrusively noncommittal or distrustful. This attitude is very likely to inspire distrust in his human friends. It was expressed by Madam Abreu, who in speaking of Cachesita said that although he had never done anything to justify it, she had a lurking suspicion that he should not be trusted and that sometime when an excellent opportunity came he might act ungratefully if not maliciously.

Most persons in speaking of the manlike apes confuse the orang-utan, chimpanzee, and gorilla. This is not surprising, considering the superficiality of our lay knowledge, for certainly these three types of ape do not differ more obviously than do such subdivisions of mankind as the American Indian, the Caucasian, and the Negro. The hairy coat and the complexion of the orang-utan are reddish. The coat of the chimpanzee is more commonly brown, gray, or black, although the naked skin may be almost as light as that of the Caucasian. The complexion, however, ranges from black to white. In the gorilla, the coat color ranges from gray-black to jet-black and the skin color from brown to black. It is easy then to distinguish the orang-utan from the chimpanzee and gorilla by the color of hair, and the chimpanzee and gorilla may be told from each other by the difference in facial features.

The chimpanzee is the center of interest and the favorite in the Abreu collection of primates. The individuals range in age from less than two years to as much, perhaps, as twenty-five years; in skin-color from specimens which are almost as white as the light-skinned Caucasian to those which are as black as the African Negro. Superficially the chimpanzee more closely resembles man than does any other anthropoid ape. Whether it is also closest to man in mental traits



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A WHITE-HANDED GIBBON

This picture is reproduced to show the extraordinary length of arm in gibbons and the remarkable contrast between the gray gibbon, page 52, and the white-handed species. The one has a jet-black face surrounded by nearly white hair, the other a very light face surrounded by dark hair.



CACHESITA, AN ADULT MALE ORANG-UTAN

Even if not beautiful otherwise, he has the advantage of a neatly inconspicuous ear. Cachesita is thoroughly at home at Quinta Palatino, but his keeper considered it discreet to sit close by during photography so that the clever climber might not escape to the top of some royal palm.

and their expressions in behavior, social relations, and structural characteristics, can be decided safely only in the light of much more detailed and accurate observation.

The temperament of the chimpanzee is such that he has naturally become a favorite with animal-trainers and exhibitors, and specimens are found in zoölogical gardens, circuses, and private collections where perchance all other types of anthropoid ape are lacking. The animals are ordinarily docile and affectionate when young and lend themselves readily to the requirements of the exhibitor. Madam Abreu tells of her pets an interesting story which will illustrate these points.

The pair of chimpanzees which she first acquired she kept for some time with her in France. The male was called Chimpita and the female Cucusa. Both were adult. They naturally attracted much attention and it is not strange that their owner should have been asked to let them perform in a "*représentation gratis*." She demurred, saying that they knew no tricks, except that Chimpita could ride a bicycle a little. Finally she consented and Cucusa was garbed in an Empire dress and Chimpita as a sultan.

"We sent the animals to the stage. Cucusa's dress was very long and she, the little wife, was short, but without being taught she held up the

skirt with her hand. Everybody applauded. Then Chimpita and Cucusa went to a small table and took their meal and cigarettes. After that Chimpita did a little bicycling. Then he came back, gave Cucusa his arm, and they went away."

The secret of the chimpanzee's success as an actor lies quite as much in his love of attention as in his docility. Childlike, the animals seek attention and, having gained it, strive to hold it by amusing antics.

Madam Abreu had acquired Chimpita first; wishing to find a suitable mate for him, she purchased the little female white-face, aged three or four years, which she named Cucusa. She is supposed to have been captured in Sierra Leone. Although very affectionate, this animal was by no means so intelligent as Chimpita. The two were friendly, companionable, and, after maturity, mated, but according to reports certain structural peculiarities or abnormalities of the male prevented reproduction. Madam Abreu believes, however, that the failure of this pair to reproduce was due to difference of species or variety. Indeed, she says that she has three times tested the matter by trying in vain to mate chimpanzees from different parts of Africa which presumably represented different species or varieties.

Next, in order of addition to the collection, came Mimosa, a four-year-old female who was

like Chimpita in being a white-face and from the Congo, and Jimmy, an adult male said to be from Sierra Leone and at the time of purchase supposed to be about twelve years old.

Mimosa lived in the collection for perhaps ten years. She is said to have been good-natured, good-tempered, and more intelligent than Cucusa, for whose first baby she served faithfully and willingly as attendant. It is recorded that Mimosa died of dropsy. Presumption is in favor of tuberculosis.

Jimmy and Mimosa were long companions, but they had no offspring because, Madam Abreu believes, they differed in type and place of origin.

Jimmy was purchased from an animal-trainer who had exhibited him on the stage in Europe. His owner parted with him, though reluctantly, as he was becoming too strong and also too old for safe use on the stage. Madam Abreu says that the trainer told the animal to be bad to her. She believes that his obvious dislike for her and his persistent attempts to injure her are due to the circumstances of change of ownership and environment. This does not appear incredible, for the animal doubtless preferred his exciting stage life to the less eventful life in captivity which he has experienced since being brought to Havana.

It is somewhat more than ten years since

Jimmy was purchased for the collection, and his age at present is estimated as between twenty and twenty-five years. No direct physical measurements are available, for he is unsafe to approach and is kept in a strong iron cage. His weight probably approximates one hundred forty pounds. Despite the best of care, including an abundance of nutritious food, he is spare. He is, however, very muscular and both his physical condition and his behavior suggest the prime of life. His coat is heavy black, with a sprinkling of white hairs on the back and about the mouth. As he lies on his back on the cage floor, with legs elevated and drawn close to the body and arms under his head, he looks short and stocky, but when he stands erect, or, as is more usual, walks about on feet and hands, his size and strength are impressive and the observer instinctively draws back when he makes a dash for the side of the cage.

Jimmy is peculiarly interesting because, of all the chimpanzees at Quinta Palatino, he is the only one who has to be watched narrowly and controlled by fear or coercion instead of by command and kindness. He has never been friendly to his present owner and he is not uniformly friendly with any of his human attendants or visitors. Madam Abreu reports that in the fall of 1924 he became gentle and playful with one of his keepers.



Courtesy of Doctor LeSouef

A YOUNG ORANG-UTAN IN CHARACTERISTIC ATTITUDE

The age might be four or five years



ANUMÁ, THE CUBAN CHIMPANZEE

He was almost ten years old when the picture was taken, and nearly full grown

Every one who knows Jimmy distrusts him because he has proved himself untrustworthy. The unwary visitor who approaches within reach of his long arm is virtually certain of a startling if not a dangerous experience. To attempt to seize persons who come within reach is his favorite trick. In doing this he exhibits skill and cunning, for he seldom makes a direct approach. Instead he places himself in a favorable position and then tries to divert the attention of his prospective victim by looking in another direction.

Apparently Jimmy is of ordinary, perhaps average, intelligence, but he is decidedly less interested in persons, less friendly and affectionate than are the other chimpanzees of the collection. Whether his temperamental characteristics are conditioned by age, sex, or species we do not know. Perhaps they are primarily individual peculiarities. It is known that some male chimpanzees tend to become morose and treacherous after reaching sexual maturity. To the age of ten years they are likely to be gentle and docile, but experienced keepers and trainers prefer not to take chances with the animals after they have attained maturity or are fully grown. Even the adult female is a dangerous antagonist when aroused to the defense of her young.

April 27, 1915, was a great day at Quinta Palatino, for it witnessed the birth of Anumá, son of

Jimmy and Cucusa. Known as "the Cuban chimpanzee," he has attracted more attention than do most persons, because among other things he is the first chimpanzee, born in captivity in the New World, who has survived longer than a few weeks. Anumá not only has survived, but in the past ten years has grown into a splendid specimen of his kind. He is tall, straight, agile, good-natured, affectionate with his friends, and alert, although Madam Abreu insists he is not so intelligent as her first chimpanzee Chim-pita.

Anumá's skin is brown, heavily freckled with black spots. His complexion is considerably lighter than that of his father, Jimmy, and as he stands erect he seems almost as large, although possibly he is not quite so heavy and muscular as the latter. Jimmy, however, looks decidedly mature and is set in his ways, whereas Anumá seems very boyish and is obviously adolescent. The father is sullen, morose, and not given to useless activity except in the event of fear or anger; Anumá is playful and always ready to make advances to attendants or visitors. Although rarely has he injured any one, it would be rash to trust one's self to him, for even his play might become dangerously rough.

Childlike, Anumá constantly strives to attract attention and entertain. It is only necessary to

approach his cage to set him going. Considering the meager equipment which he has at hand, his tricks and acrobatic stunts are most interesting. I have seen him seize with both hands a swinging bar and, having secured momentum for a full excursion on the bar, release it with one hand and with the free hand strike the sole of his foot rhythmically. This he does skilfully and with evident intent to entertain rather than to exercise himself. Usually after such a performance he releases the bar, drops to the ground, and claps his hands together vigorously, as if to elicit applause. It is his delight thus to attract visitors to his cage and to induce them to run with him or perchance, if courageous, to come within reach and pet him or be petted.

Anumá's adolescence draws to a close. It is fairly certain that in a year or two he will be mature mentally as well as sexually, and it is probable that by that time his temper will begin to change and his trustworthiness diminish.

Cucusa, the first mate of Jimmy and the mother of Anumá, died in France after the birth of a baby. It is said that she took cold. The baby also shortly died. Mimosa, Jimmy's second mate, died without offspring. Thereupon Monona, an adolescent female who had been added to the Abreu collection when about three years of age, was mated with Jimmy. Monona is a white-face

chimpanzee from Sierra Leone whom Madam Abreu considers more stupid even than Jimmy and also unaffectionate.

The union of Jimmy and Monona resulted in the birth on January 22, 1923, at Quinta Palatino, of a female infant named Lita. At the age of approximately two years this infant is healthy, active, bright, and good-tempered. It will be recalled that Madam Abreu considers both Jimmy and Monona stupid. She thinks that Lita is somewhat more intelligent than either parent. As it happens the parents are rather unusually unappealing, but in considering them one must not forget that our estimate of chimpanzee intelligence and temperament is based largely on observation of young or adolescent individuals and that the relative moroseness, undemonstrativeness, and apparent dullness of adult and old individuals may be natural to maturity. Anyway, Lita has now taken the center of the stage at Quinta Palatino, thus replacing the long famous "Cuban chimpanzee," Anumá. Notable incidents in her life will be recited in a subsequent chapter. Even her advent to the world was fraught with scientific as well as other sorts of human interest, and certainly her behavior during her short span of life has been most illuminating.

Little Lita is a typical white-face. The skin

of face and body is very light, but about, and especially under, the eyes it is decidedly brown. This species or varietal character disappears with age, for the complexion gradually darkens to match the shade beneath the eyes. Because of Monona's watchfulness over Lita and her unwillingness to have her handled by persons, it has not been practicable to make physical measurements. Her weight at the age of twenty months was estimated as ten pounds. She is fearless of persons, uniformly friendly, aggressive, and playful. Her life history as well as that of Anumá should be followed with keen interest by anthropologists and psychologists.

In Madam Abreu's chimpanzee colony three babies have been born. First, Anumá, the Cuban chimpanzee; secondly, a baby which, born in France, succumbed with its mother shortly after birth; and finally, Lita, the second chimpanzee to be born at Quinta Palatino, and the half-sister of Anumá, for Jimmy is the father of all of these babies, Cucusa the mother of the first two, and Monona the mother of the last.

Of the chimpanzees in the present collection, those which remain to be described are adolescents. Nothing is more impressive to the casual visitor than their individuality of appearance and of behavior.

Caged together comfortably and amicably were

Malapulga and Sita, adolescent females, both said to be from Sierra Leone and at this time aged six or seven years. Malapulga, so called because of her bad disposition, has been at Quinta Palatino about three years; Sita for more than a year. The two contrast markedly. Malapulga is obviously the larger, possibly somewhat older, and she weighs fifty pounds, whereas Sita weighs forty-four pounds (August, 1924). Evidences well support Madam Abreu's assertion that Malapulga is rather stupid as well as ill-natured, while Sita is intelligent, aggressive, and mischievous. In skin-color and facial contour, there are striking contrasts. Malapulga's skin is dark brown and Sita's light brown. The features of Malapulga are relatively large and coarse, her face broad; those of Sita are distinctly smaller, and her face is narrow.

One can readily imagine Sita as Lita at the age of six years. In shape of face and complexion, they much resemble each other. In both, the skin of body and face is light. Sita still shows the dark circle about the eyes, but the contrast is much less than in Lita. The hands and feet of these adolescent females seem disproportionately large. Appearances indicate that Malapulga is nearly mature sexually.

Both Sita and Malapulga exhibit varied forms of play and the decorative instinct. Colored

fruits, such as oranges and mangoes, are from time to time crushed or split and then carefully placed on the shoulder or back and worn there until displaced by the activity of the animal. The decorative effort is unmistakable. Whether color plays any part has not been determined. The performance is necessarily crude because of the nature and scantiness of the materials available. It is nevertheless of psychological interest, and suggests, for the geneticists, problems which are worthy of careful attention.

In an adjoining large cage are housed four half-grown animals. Jackito is the only male among them. Supposedly from Sierra Leone, he is thought to be five or six years old, having been brought to Havana in his second or third year.

"Very bright, good-natured, obedient, and affectionate," Madam Abreu says of him. And she adds, "I think he is a dwarf."

Jackito in August, 1924, weighed only twenty-eight and a half pounds.

The three female companions of Jackito are Blanquita, Fiffille, and Lu Lu. They probably do not differ much in age, although size would suggest that Lu Lu is perhaps a year or more older than the others. She may safely be put down at six to seven years, having been purchased by Madam Abreu when she was approximately five. Her weight in August, 1924, was

fifty-four pounds. She is a black-face chimpanzee from Sierra Leone, good-tempered, motherly to little Jackito, but not exceptionally intelligent. Fiffille is pretty certainly less than six years old, having been at Quinta Palatino some three years. She is a Sierra Leone white-face, weighing in August, 1924, forty pounds, and characterized by her owner as very bright and very affectionate. She is, indeed, one of Madam Abreu's chief favorites. Blanquita, possibly the youngest of the three, having been secured by Madam Abreu when she was about two years old, is now estimated at somewhat over five years of age. She came from the Congo and, like Fiffille, is both intelligent and affectionate. Her weight in August, 1924, was thirty-eight pounds.

The social life of these four adolescent chimpanzees is full of interest. The writer never tired of watching their varied play and other activities. Of them all, Jackito is the natural center of attention because of his peculiarities. Although the smallest of the four, he manages to hold his own and have a fine time. Pretty certainly Madam Abreu is right in describing him as a dwarf. His physical characteristics and behavior suggest glandular abnormality. He is a chubby little fellow with head too large for his body, and various secondary sexual characters of the female. For example, while the hair on the

top of his head, on his back, arms, and legs is black, that on his chin, breast, and the inside of his legs and arms is chiefly white. At the end of the spine is a tuft of white hair, which is characteristic of the female. His male primary and secondary sex characters are poorly developed. Jackito, nevertheless, seems extremely healthy, is continuously active, and unmistakably cheerful. No other chimpanzee in the collection is so full of mischief. He introduced himself to me by suddenly and neatly knocking my straw hat from my head as I stood beside his cage watching the play of his female companions. This prank was characteristic. Always Jackito seems to watch attendants and visitors with a view to perpetrating some trick. When there are no human victims at hand, he treats his girl companions similarly.

Blanquita has a peculiarly sad expression, which is emphasized perhaps by her unusual whiteness of skin. One might infer that she was perpetually melancholy or disgruntled. She also is one of Madam Abreu's prime favorites and she regularly takes advantage of this relationship by claiming the attention of her owner whenever she sees her approach. This half-grown white-face in many respects resembles Sita. Dark circles appear about her eyes, as in Lita and Sita.

Lu Lu is characterized alike by her darkness of skin-color and her baldness. Jackito never tires

of teasing her. She is nearly twice his weight and it would seem should be able to protect herself against him, but he, spry and mischievous, always manages to keep just out of reach. Her motherly attitude toward him is touching. One day I watched for a half-hour while she tried to induce Jackito to come to her, perhaps for play or petting. He, like an unruly child, refused to obey and she attempted to enforce her desire by trying to capture him. Whenever she approached, he would dash off to some other part of the cage. Frequently he let her come so near that he could seize her coat and give a vigorous pull to a handful of hair, or again as she approached he would make a dash for her and as he rushed past and away punch her vigorously with one of his fists in the side or stomach. Sometimes she lost her temper, but he was invariably cheerful and obviously greatly delighted with the game. Finally Lu Lu tired and gave up the chase.

Observation of this group of four cage companions would shortly convince one that social life is highly developed in the chimpanzee. In isolation they are miserable, and if deprived of the companionship of their kind they must have some substitute. If two or more individuals of companionable age are caged together and provided with mechanical equipment, they can have an interesting and healthful life even in fairly

close quarters, but to cage them in isolation appears to be the acme of unkindness.

Yet another adolescent female is the present companion of Anumá, known as Miñita. She is a five or six-year-old Sierra Leone specimen purchased by Madam Abreu at the age of two to three years, and recognized favorably for her good temper and tactfulness. It is thought that she is somewhat less intelligent than Anumá, but she certainly makes up for any such defect by her temperament and discretion.

In the colony there is yet another, the youngest and smallest of all with the exception of Lita. It is Fru Fru, who early in the summer of 1924 was purchased by Madam Abreu in New York. She is possibly between three and four years old, a white-face from Sierra Leone, full of activity, playful, sympathetic, and affectionate, and of not less than average intelligence. Her black coat is somewhat sparse and she is surprisingly untidy. As contrasted with the neatest chimpanzees which I have known, she is decidedly careless-looking and unkempt. It occurs to one to wonder whether this personal condition is due to temperament, characteristics of her coat and skin, lack of intelligence or initiative, lack of parental or species training, or to a combination of these factors. Such differences as appear in persons with respect to care of their bodies and dress certainly

are matched by the chimpanzee. We probably are not more highly individualized than they, nor would it seem that our differences individually and racially are more significant than those found in the anthropoid apes.

There are three chimpanzees which should be mentioned among those which have come and gone, for Madam Abreu has had her share of bad luck in keeping these highly complex creatures.

Coco was purchased in Paris at the age of four or five years, having been captured some time previously in the Congo. Although stupid, he was unusually good-tempered. He died at about ten years of age from an amœbic disease thought to have been contracted from orang-utans which brought the trouble to Quinta Palatino and which themselves died of it.

Betsey, a Sierra Leone female, was ten or twelve years old when purchased. She survived for only about six months. Her death also was due to an intestinal disorder which resulted in extreme diarrhea.

Finally, Minina, aged about four years, died of tuberculosis July 22, 1924. She was a black-face Sierra Leone, bright and good-natured, but when first observed by the writer, was in the last stages of her dread disease.

The gorilla, king of the anthropoid apes by virtue of his size and strength, is conspicuous by



JACKITO, POSING OBEDIENTLY



Courtesy of Miss Alyse Cunningham

MISS ALYSE CUNNINGHAM WITH HER YOUNG GORILLA, SULTAN, OR JOHN DANIEL SECOND

his absence from Quinta Palatino. Madam Abreu has not willingly suffered this absence to continue. Repeatedly and persistently she has striven to secure specimens of this extraordinarily interesting type of primate.

The young gorilla has proved exceptionally difficult to keep in confinement, and adult individuals are almost unknown in captivity. The recent experiences of Miss Alyse Cunningham (12), who for several years has succeeded in keeping young gorillas in healthful condition, clearly point to the necessity of intelligent feeding, hygiene, and companionship. Perhaps companionship should be put first, for the gorilla pet which she first had, died only a few months after she parted with it, apparently because of lonesomeness. It is entirely possible and even probable that the lack of success on the part of animal-keepers and trainers and authorities in zoölogical parks and circuses is due at least as largely to failure to supply suitable companionship, either animal or human, as to improper or inadequate feeding or exposure to disease.

The gorilla is by no means so appealing, either structurally or in behavior, as the chimpanzee, for its features and bulk give an overwhelming impression of strength and aggressiveness, and its temperament seems unfavorable to domestication. It develops attachments to persons and be-

comes affectionate, but its aggressiveness, coupled with its dangerous strength and inconvenient size, negatives its possible value as a pet or performing animal. Early descriptions of the gorilla made it out an extraordinarily ferocious beast, the dread of the natives of its habitat, and one of man's most fearful enemies. Carl Akeley (10) and Mary Bradley (11), however, paint a very different picture of the mountain gorillas of the Belgian Congo. These naturalists say the animals are not aggressive, and seek only to avoid mankind. This description, however, does not affect the general conclusion that in degree of docility and good nature the gorilla is so far inferior to the chimpanzee that it is not likely to usurp the latter's place in zoölogical gardens, on the stage, or in scientific laboratories.

It is said that the brain of the gorilla more closely resembles man's than does that of any other ape. Possibly on this account it has been assumed that he ranks next to man also in intelligence. This comparison, at any rate, has not been justified by observation. No one has ventured to suggest that the gorilla is the most man-like of the anthropoid apes in temperament and character. Certainly if he is, man has abundant reason to envy the chimpanzee!

CHAPTER 5

PRIMATE INTELLIGENCE

THE intelligence of the primates is of perennial human interest rather because of the impressive similarity of the mental traits of anthropoid apes to those of man than because man is himself a primate. In all probability the chief intellectual functions in monkeys differ no less from similar functions in the great apes than the latter do from those in man. Since the mind of the ape seems to be midway between that of monkey and that of man, it may be most profitable to concentrate attention on the intelligence of the chimpanzee and to use Madam Abreu's observations and the other data afforded by her chimpanzee colony to indicate some at least of the important characteristics of the anthropoid mind.

Certain incidents related by Madam Abreu are worthy of record and may direct the course of description.

Of the birth of Lita it is reported by Madam Abreu that her negro servant Andres was attracted early in the morning by Monona, who rattled the chain which held her. He loosed the ani-

mal and turned to attend to other duties. Returning shortly he discovered that a baby chimpanzee had been born but was seemingly dead. Presently the mother began to work over it, breathing into its mouth and drawing its tongue out with her lips.¹ After a period of this treatment the infant began to breathe. She then cleaned it thoroughly and subsequently chewed at the umbilical cord until it was shortened to about a half yard. Somewhat later she chewed it off close to the body of the infant.

Was the adaptive behavior of Monona toward her new-born infant indicative of insight, intuition, or instinct? Its suitability is obvious. If the infant had been neglected, it probably would have succumbed. Behavior of this sort is impressive and not the less important or suggestive of biological problems if performed without insight. One can but wonder how many inexperienced human mothers would act as appropriately. The subject is of extraordinary interest, but it is freely granted that the behavior of Monona may not indicate a high level of intelligence.

As a sequel to this story, it is related by Madam Abreu that some months ago there was born to a pair of her rhesus monkeys an infant which, like

¹The critical reader may ask how much of this is verifiable observation and how much interpretation. It is the task of the investigator to find out.

Monona's, seemed lifeless. As the mother paid no attention to it, one of the attendants removed the baby from the cage and took it immediately to Madam Abreu who, profiting by the lesson given by Monona, practised on the monkey baby the same procedure for revival. Breath was blown into the little creature's mouth, its tongue was drawn out, and its arms were worked rhythmically to stir the action of the heart and to initiate respiration. Within an hour the animal was in good condition, and it has since grown and developed normally and healthfully.

Madam Abreu acted intelligently and with insight. The mother monkey failed to act appropriately on any basis whatsoever. If the chimpanzee mother, Monona, acted without insight, either intuitively or instinctively, then it would appear reasonable to suppose that in similar circumstances most chimpanzee mothers would act likewise. It remains for further observation to settle for us questions of fact and to convince us of the mental quality and characteristics of Monona's act.

"One day Chimpita, my first chimpanzee, and his wife Cucusa escaped from their cage. Several of us pursued them and the guard of Quinta Palatino began to shoot into the air to frighten the animals back into their cage. At the same time one of the men called to the animals, com-

manding them to return. Chimpita obediently came, and Cucusa, who was in a tree, climbed down and, going to the guard, took hold of his hand and took the revolver away from him." It is not surprising that Madam Abreu should have recorded this incident as evidence of intelligence closely approaching to the human. At the moment we may not stop to discuss the matter further than to note that such an act probably could not reasonably be expected of any living type of animal other than the great apes or man.

"Once when we were transferring Chimpita and Cucusa from one cage to another, the female was taken first; Chimpita succeeded in escaping from his cage—as if he wished to say he would not stay alone! It was Sunday and my house was full of visitors. I ran after Chimpita, the guard ran, everybody ran! When the guard approached to put on his chain, Chimpita grasped it and threw it away, as if to proclaim 'liberty.' Then he climbed to the top of a mango-tree and refused to come down." The conclusion of this story belongs rather under sympathetic emotion than under intelligence and therefore is reserved for the next chapter.

Chimpita's behavior in this instance is obviously comparable in order of intelligence with that of Cucusa in taking away the revolver of the guard.

"I was feeding grapes to Chimpita one day and

he swallowed the seeds. I told him that he must give the seeds to me, for I was afraid they might cause appendicitis, so he gave me all the seeds he had in his mouth and then picked some up from the floor with his lips and his hands. Finally there were two left between the cage wall and the cement floor which he could not well get with either lips or fingers. I said to him, 'Chimpita, when I have gone you will eat those seeds.' He looked at me as if he asked why I bothered him so much. Then he went into the next cage, looking at me all the while, got a little stick, and with it poked the seeds out of the crack and gave them to me." Such behavior demands careful scientific analysis. It would be difficult to match it in the lower mammals, but it is characteristic of the great apes. The extent to which Madam Abreu's animals understand what she says to them is startling to the lay visitor who is unaccustomed to the almost human traits of the creatures.

"Once we were driving into the city to have a little chimpanzee who was ill radiographed. As we drove along she looked at me and evidently noticed that I had a hat on my head, so she took the hat from a man in the car and placing it on her head insisted on keeping it there until we arrived at our destination." Doubtless it is just such behavior as this which gave origin to the word "aping" and at the same time fixed its

meaning. It is impossible, with our present superficial knowledge of the facts, to determine the measure of intelligence, or indeed the kind of intelligence, involved in such behavior.

The following incidents indicative of intelligent coöperation with persons also have peculiar significance:

“Once when I was away and one of my sons was here in charge of my animals, Chimpita escaped. He broke through a window and in doing so got pieces of glass in his arm, which he cut badly. My son thought it necessary to remove the pieces of glass and dress the arm. While he worked over it, Chimpita was quiet and patient, behaving just as a sensible person naturally would.”

While the writer was studying Madam Abreu's primates, a blood-transfusion operation was performed in an attempt to save the life of one of the chimpanzees. As a preliminary to the operation the blood of several of the adolescent chimpanzees was examined to enable the physician to select as the “donor” an animal whose blood was of the same type as that of the invalid. The several animals behaved quite differently in the operation. Some struggled violently when the sample of blood was taken from the arm; others seemed to understand that no harm was to be done them and coöperated as might a person.

When it came to the transfusion operation itself the sick chimpanzee was too weak and listless to struggle, but the animal whose blood was to be borrowed was a healthy, vigorous creature whom one might naturally have expected to rebel against the treatment of the surgeons. Instead she lent her aid to them and remained virtually quiet throughout the operation. The physicians themselves were so impressed by her coöperation that they expressed keen regret in not having secured a moving-picture record of the operation which should show in detail the behavior of both of the chimpanzees involved.

The writer can match these instances of chimpanzee coöperation with human attendants or helpers from his own experience with a pair of young chimpanzees which needed medical attention. The treatment required was for hookworm and each of two animals, a male and a female, was handled and treated in the same manner and with as little disturbance and discomfort as possible. The little male, having suffered his jaws to be wedged apart and a stomach tube inserted, became quiescent and acted throughout the treatment as though he implicitly trusted the wisdom and good intentions of his human attendants. The female, on the contrary, resisted the treatment at every stage and continued to struggle to the end. Was hers lack of confidence or lack of understand-

ing? From the above description it might be assumed that the male was meek and lacking in initiative by comparison with the female, but as a fact the opposite was true; and apart from difference in intelligence any one intimately acquainted with the two animals might naturally have predicted that the male would resist to the limit of his strength and the female yield co-operatively to the demands of the physician.

Evidences such as have been presented might be multiplied almost indefinitely from the experience of Madam Abreu and her assistants and from the observations which the writer has himself made or has found in the records of reliable investigators, but there is no point in doing so. It will serve better in extending and refining our knowledge of primate intelligence to consider other aspects of behavior and other relations of the animals to man.

Those who know the great apes only through reading or by casual observation of specimens on the stage or in zoölogical gardens cannot appreciate either the intelligence or the emotional traits of the animals. This would be equally true in the case of any other organism. To the casually interested layman all of the types of great ape—orang-utan, chimpanzee, and gorilla—look and act much alike, but so do all individuals of a given human type. It behooves us, therefore,

to remain open-minded and critical in all matters of which we have scant first-hand knowledge. Particularly is this true of the characteristics of animals which at once so closely resemble and so repel us as the great apes.

When one observes and reobserves, he actually sees more and more and penetrates increasingly into the maze of behavior-patterns which enter into the relation of an organism to its world. At the same time there grows up a sympathetic relation which comes to involve at once mutual confidence and understanding, so that as the observer becomes increasingly able to see understandingly, the animal through familiarity with him comes to act more naturally and freely. It is precisely this sort of relationship which has come to subsist between Madam Abreu, the lover of animals and their best of friends, and the population of her primate colony. There are, to be sure, individual differences in degree of intimacy, for some types of primate she greatly prefers over others and some individuals make strong appeal to her, whereas others may command only her pity.

As one lives with a type of organism, and studies it day by day, intimacy of relation and understanding develop not so much on the basis of exceptional acts or adaptations as from the cumulative effect of seemingly trivial incidents. And so it is strictly true that when one is asked to

justify his conviction that a type of animal, or a certain individual, works ideationally and with insight, or with sympathy and affection, one may find it peculiarly difficult to cite convincing evidence or to provide a demonstration. In this chapter the attempt is made to present certain significant incidents and to achieve a cumulative effect by backing these incidents with descriptions of minor, but none the less essential and important, bits of behavior from the daily life of the chimpanzee.

It has long been believed by animal psychologists that the use of objects as tools indicates either a relatively high order of intelligence or a specialization of reaction-pattern which is quite as interesting and significant biologically as sheer intelligence. Now it happens that all of the primates are structurally fitted, far beyond the measure of most other mammals, to use objects as tools. The development of both hand and foot, with the prevalence of opposable thumb and great toe, makes possible not only expert climbing and life in the treetops, but also the extraordinarily dexterous and skilful handling of small objects.

The monkeys, although structurally capable of doing so, do not habitually avail themselves of objects as aids in meeting the ordinary problems of environment. Indeed, their relations to objects as possible tools are surprisingly different from



LU LU (LEFT) AND JACKITO WITH ANDRES



POSING AN ACTIVE
CHIMPANZEE

This is Chim during his
sojourn in Washington,
D. C.

those of man and only slightly less so from those of the great apes. The writer has known intimately only one monkey which seemed to have an aptitude for the use of tools and in its case they were clearly play objects in the manipulation of which it took extreme satisfaction. Elsewhere [Yerkes (8)] the facts have been described and this monkey, Skirrl, characterized as a mechanical genius. What one individual may do, others also may be capable of. Perhaps, after all, the primates as a group are gifted with intellectual as well as manual ability to use objects and through such use to prove to us their superiority over four-footed creatures. As the evidences are more abundant as well as clearer, it may profit us most to direct our attention again to the behavior of the chimpanzee.

In the case of this creature the use of objects as tools is so common as to be taken as a matter of course even by the lay observer. Anything which lies at hand is pretty sure to be used not merely as a plaything or something "to be monkeyed with" as in the case of the true monkeys, but also as something with which to attain certain desired ends. For example, the chimpanzee separated from his mate by a wire partition and unable to reach her otherwise, is seen to use a straw to caress her face. Repeatedly it has been noted that the animals will use bits of grass, sticks,

wires, or anything else available to draw in objects which they desire as food. At times this use is highly skilful; again it may appear rather stupid, although through persistence it results in success. For the safety of the animals, the cages at Quinta Palatino are kept almost clear of loose objects. The furnishings for exercise and play are securely fastened and cannot be used except as intended. Consequently there is relatively little opportunity to observe in the chimpanzee colony the spontaneous and adaptive use of objects. Madam Abreu's experience, however, has offered abundant opportunity to study the use of things for utilitarian purposes and inventiveness in play.

Again and again it has been demonstrated in connection with tests of intelligence that the orang-utan, the chimpanzee, and the gorilla can and do use objects effectively to attain such desired ends as food, freedom, or opportunity to play. The results of experiments are reserved for the next chapter. They are varied, positive, and indicative of an order of intelligence which certainly suggests the human, if it does not closely approach it.

In the playfulness and inventiveness of the great apes there is additional food for thought and speculation about the quality of their intelligence. From birth onward into maturity they play not

only persistently but with variety of performance and degree of inventiveness which approach our own. The young apes, like children, are continuously active and always eager for play. They are equally willing to accept as playmates children, human adults, or members of their kind, but they quite obviously prefer their kind and also their size. Especially by young and adolescent apes children are preferred as playmates. Their games naturally tend toward running and chasing, varied with mock fighting. Whether in the wild or captive state, they chase one another a great deal, and although sometimes their play becomes very rough, the writer has seen no record of intentional injury in play, nor has he himself observed even accidental injury.

At Quinta Palatino there is no opportunity to observe play in the gibbon, because of the isolation and lonesomeness of the individual. The three orang-utans which are caged together play much, but with less spontaneity, versatility, and eagerness than the chimpanzees. One gets the impression in watching them—and this also is Madam Abreu's conclusion—that they are considerably less intelligent in such matters than the chimpanzee. So it happens that again we naturally turn to the chimpanzee cages for our materials of illustration.

As we approach Anumá's cage we are greeted

by an unusual evidence of playfulness, for picking up a mango, the chimpanzee tosses it at us with skill and accuracy of aim which suggest the baseball player. As the mango is returned to him he catches it as deftly and with at least as much assurance as he threw it. Inquiry brings out the fact that he has had abundant opportunity to play with balls as well as with such fruits as oranges and mangoes. Doubtless he has been played with much by human companions. Skill in throwing and catching has been acquired as in the case of a person. His interest in the performance seems no less than ours, and his delight in playing with any one whose attention he can command is infectious.

Both Anumá and his father, Jimmy, have in some unknown way, perhaps through imitation of persons, acquired the trick of hand-clapping. They perform somewhat differently, in that Anumá swings his long arms at full length, bringing his palms together with a sound like a pistol-shot, whereas Jimmy is content with the more modest sort of human clap. Ordinarily he does not swing his arms, but instead brings his palms together vigorously in a less enthusiastic manner. There can be no doubt that both of these chimpanzees use hand-clapping to attract attention. When Jimmy sees an attendant approaching one of the cages with food, he frequently begins to

clap. Anumá, on the contrary, more frequently performs this trick in connection with play. He applauds his own acrobatic performances and joins with visitors in applauding anything that receives their approbation. Undoubtedly these animals could be taught a great variety of tricks and games. Already we are familiar through the stage with several possibilities which have been actualized, and it is needless to dwell on the skill which the animals exhibit in riding a bicycle and in other acrobatic feats.

In free play Jackito and Fru Fru supply endlessly interesting variety. Mostly they indulge in games of chasing and catching, but they constantly vary these with sly tricks which often result in what would be to us serious falls. Quite incomparable with anything else in this line observable at Quinta Palatino are the acrobatic stunts of Blanquita, Fifille, Lu Lu, and Jackito. In their cage they have a strong bar suspended by chains, also an iron ring on a chain, and under the roof a half-floor to which they can climb or swing at their pleasure. On the swinging bar they perform antics which are important rather on account of their variety than the remarkable dexterity exhibited.

Some notion of this variety is given by the following transcription of notes made in a few minutes before the cage.

Lu Lu, grasping the iron ring with both hands, swings vigorously, with legs dangling, rapidly increasing the amplitude of the swing. Then suddenly she releases her grasp and seizes, as she swings to it, the trunk of a tree in the midst of the cage and some four or five feet from the ring.

Swinging by one hand from the limb of a small tree at one end of the cage, she slaps the soles of her feet against the top of a concrete nest box as she passes it. This repeatedly.

Grasping the swinging bar or trapeze with both feet and both hands, she swings back and forth with head hanging down.

Having taken her seat on the trapeze, the bar of which is only two or three inches in diameter, she places her back against one of the side chains and vigorously swings the trapeze from side to side instead of back and forth.

Seizing the ring with three of her extremities and the trapeze with the fourth, she swings herself back and forth jerkily between the two with head down.

With one hand and one foot grasping the trapeze and the others dangling below, she swings back and forth.

Fifille swings rapidly on the ring, holding by both hands. Suddenly she jumps from the ring to the side of the cage and drops to a shelf near the floor, whereupon she makes the large cage

rattle by repeatedly striking her shoulder against the side wall.

Suddenly she jumps from the side of the cage to a small tree, rapidly swings around it several times, holding to it with one hand, and then with a single spring reaches the opposite side of her cage.

Sitting astride the trapeze, she clings to it with both hands, then flattens out and rests with stomach on the trapeze, relaxed, arms and legs hanging limp.

Jumping from the small tree, Fiffle stands on her head on the nest box. Immediately Lu Lu follows and playfully tips her over. Thereupon a tussle ensues which ends in Fiffle's falling from the roof of the nest box to the cement floor of the cage head first, but without harm.

Both animals climb to the half-floor in the upper part of the cage and there on a beam they swing, each grasping the beam with one hand and with arms and feet interlocked. Suddenly they jump to the iron ring which each clasps with one hand and each with an arm about the other they swing head downward.

These are incidents in a busy play-day. Almost endless is the variety of attitude and antic in individual and group play.

It cannot fail to occur to the thoughtful observer that the resources of the captive apes at

Quinta Palatino are very meager. For their own protection they are deprived of movable objects with which they might injure one another, and also of small things like bits of wire, nails, or fruit stones, which they might swallow. They have virtually nothing available for use as play-things or tools except chains, trapeze, and rings. The animals are almost wild with delight when by chance they succeed in getting hold of an object outside of the cage. It matters not whether it be a hose which they can drag through the bars and amuse themselves with, or the hand or clothing of a passing person. How much more impressive their behavior might be in an entirely natural environment is difficult to say, but it is easy to imagine that there must be a vast difference between life in the African habitat of the chimpanzee and that in the cages of a zoölogical park, a traveling show, or even at Quinta Palatino.

Whether or not it bears on intelligence we do not know, but at any rate it would be unfair to omit from this story Madam Abreu's description of what she calls the "vision of death." There follows her report in her own words:

"The first time it happened I was in Cambo les Bines. It was on the death of Cucusa. A moment before she died she took my head in her two hands and kissed it, very long. She saw that



YOUNG CHIMPANZEES BLACKBERRYING IN NEW HAMPSHIRE

Chim and Panzee greatly enjoyed their New Hampshire pasture, and especially the blackberries, green, red and black!



JULIUS, THE ORANG-UTAN, IN MONTECITO VALLEY, CALIFORNIA

The pose is characteristic, the background appropriate



CHIM QUENCHING
HIS THIRST AT
THE TAP

He seemed to feel that
he must continue to drink
as long as the water flowed!

death was coming and was saying good-by. Then she jumped from me to her bed and died. Jimmy, who was outside in the park, began to scream. He continued to scream, looking about as though he saw something. The next day he still kept watching, far away toward the mountains.

“Here at Quinta Palatino when Mimosa died, he did the same thing. He screamed and screamed and screamed. And he kept looking and looking with lower lip hanging down, as if he saw something that we could not see. His scream was different from any I have heard at other times. It made my flesh creep.

“On two or three other occasions, when little monkeys have died, he has screamed in the same way and watched and looked out. I had him observed, to see if there were animals passing or if it was one of his cage companions that excited him, but there was nothing passing by and yet he screamed. Then later, after he had stopped, we let other animals pass his cage, but he paid no attention. So it seems that it was nothing outside that disturbed him. It is five times, I think, that he has done this. The other day when little Minina died Jimmy did not scream, but perhaps this was because he did not know Minina.”

The “vision of death” is one reason why Madam Abreu believes that the chimpanzee has

a soul. Perhaps she would not wish to deny it to her other pets, but at any rate she is firmly convinced that it may not be denied to the chimpanzee.

CHAPTER 6

ACCIDENT OR INSIGHT?

TO supplement the picture of anthropoid intelligence drawn from Quinta Palatino, this chapter offers a general account of what psychologists have discovered. "Supplement" is used intentionally, for what has been observed in Havana is typical and consistent with the results of experimental inquiries.

As one strives for fuller knowledge of ape behavior and for understanding of its significance, the words "monkeying," "aping," and "thinking" become more meaningful. "Monkeying" we usually think of as plain fooling with things. It is common alike in infants, children, and monkeys. Through it the individual acquires, largely by accident, useful experience. "Aping" takes us a step higher, for in it the animal tries to do what another creature is doing or has done. There is more than the suggestion of effort to achieve a certain goal. Sometimes we think of it as purposeful imitation and again as relatively automatic behavior. Perhaps monkeys sometimes ape, but in any event this kind of behavior

is characteristic of the great apes and the word therefore seems peculiarly appropriate. "Thinking," although not a satisfactory term for the kind of action we have in mind, will serve to point the contrast between behavior which is definitely directed to achieve a certain purpose and clearly exhibits insight and foresight, and that which, like monkeying or aping, is either random movement or a rather vague and uncertain striving toward a goal. Thoughtful action, or better, ideational action, is characteristic of mankind, but are we certain that it does not appear also in the anthropoid apes and possibly in the monkeys?

Certainly, as we follow through the life of the human individual we note monkeying, aping, and ideational behavior in this order and in varying relations. The infant at first does almost nothing but "monkey." Later "aping" appears, and it is perhaps through it that the child learns to talk. Still later action becomes dominantly thoughtful, purposeful, and indicative of insight and foresight. It is the purpose of this chapter to throw light on the question: Do the anthropoid apes act out their lives a step higher than the monkeys and a step or two lower than man, or are they, instead, capable of acting with insight? It is the perennial question as to whether animals reason. Many observers have asked themselves, when watching a trained orang-utan, chimpanzee, or

gorilla: Is he able to understand problems and to solve them by using ideas as do we? Has he memory images, ideas, insight, and perhaps also foresight? If so, how does it happen that he does not talk?

The psychologist assures us that there are two highly important and interesting aspects of mind and its expressions, which are inseparable and equally essential to normal behavior. We may speak of them as the life of feeling and emotion and the life of thought and reflection. In ourselves we know both of these types of experience, know also that in each moment of consciousness the one or the other is dominant. Although we may commonly think of ourselves as primarily thoughtful and reflective in our behavior, most of us actually are highly emotional and more often than not act out our feelings. Whether the great apes actually "feel" as we do when they behave as we should, no one has yet discovered. But it must be added that not even in one another have we made this discovery.

Of the life of thought and reflection, the processes of which are comprehended in the popular term "intelligence," much is known, thanks to the patient investigations of psychologists, and it therefore is possible to compare in interesting fashion the intelligent behavior of man with that of the great apes. Among other things it has

been discovered that the intellectual life springs mainly from the senses. Sight, hearing, touch, taste, smell, and several other less widely known modes of sense, contribute elements which go far to make up our consciousness of the world and of the self. Sense impressions are among the materials from which the self and its environment, as consciously experienced, are fashioned. They are also the materials of thought. To be sure, in all cases elements of feeling also appear. If, then, the great apes, or any of them, act ideationally or with insight, it must be because they have sense impressions and images more or less like our own.

This impels us to inquire, What is known about the senses of the anthropoid apes? Not even the more important of the special senses have been thoroughly studied in the different types of primate. Nevertheless, there is certain fairly reliable general information which may be taken as indicative, and which is valuably supplemented by more detailed and exact knowledge of a few modes of sense.

Smell and taste are very poorly developed in most men, and seemingly also in the great apes. They, like us, use these senses in investigating or testing foods and drinks. So far as observations on record go, it would seem that these, the so-called chemical senses, are similar in all of the

higher primates. Undoubtedly, more intensive study will reveal differences from species to species, just as in man himself we find significant differences from individual to individual.

The sense of hearing is keen in all of the anthropoid apes, and the organs on which auditory impressions depend are similar to our own. Everything thus far discovered suggests that this sense plays an important rôle in the life of the apes. Yet, despite the fact that they have excellent voices, they apparently are less influenced by sounds and less inclined to reproduce or imitate them than are many other kinds of creatures. Our knowledge is far too meager to justify dogmatic assertion, but it warrants the surmise that this sense is capable of a high degree of cultivation and functional usefulness in the anthropoid apes, as in man.

Touch and the senses which have to do with bodily attitude and movement seem to be acute and important, as in us. The animals are even more skilful in many of their motor adjustments than are we, and in some instances their acrobatic achievements are truly marvelous. Their behavior in respect to these almost certainly implies a sensory and central nervous mechanism of the human order of complexity and functional perfection.

The ape's sense of sight or vision has been

studied more carefully and persistently than any other of the modes of senses. Again the evidence is indicative of essential similarity to man. To see, in the visual way, is by no means a simple matter. In fact, there are many kinds of seeing, and visual impressions constitute systems of which color sensations and achromatic sensations are the chief types. Now it appears, from painstaking experimental inquiry, that the chimpanzee possesses color vision, as well as ability to distinguish white, grays, and black [Kohts (4) and Koehler (5)]. We may not say that its visual sensations are identical with our own, but they seem to serve like purposes in its adaptations to its world.

Further, it has been shown by Koehler, that the appreciation of distance or depth is dependent in the chimpanzee, as in us, on the use of two eyes instead of one. When both eyes are used, distance is more accurately gauged or estimated than when either eye is used alone. This is equally true, it seems, of man and chimpanzee. Experiments indicate also that the one eye, when used alone in measuring depth, is likely to be more accurate than the other.

We humans ordinarily are either right- or left-handed. It is less generally known that most of us also are either right- or left-eyed. Koehler discovered this fact in a young chimpanzee whose

vision he investigated. He also demonstrated with this animal that the visual perception of size and of luminosity is, as in the case of man, affected by the total situation, instead of being determined simply by the intensity of the particular stimulus. If, for example, the animal is trained to expect to find food in the larger of two boxes, it will continue to choose directly by means of sight when the larger box is placed so much farther away than the smaller one that its image in the animal's eye is much the smaller of the two. Or again, if as between a white and a black box, the chimpanzee has been trained to expect to find a reward in the former, it will continue to choose correctly even when the black box is so strongly illuminated that it, physically speaking, is whiter than the other. These are important facts, which suggest that further search may reveal other surprising psychological similarities between man and ape.

Sense impressions may be received, serve their transient purpose, and disappear, or they may effect such a change in the organism that they may later be reproduced as images. In the latter case the animal has what we call memory, or, if the images are freely and unusually combined, imagination. Have any of the apes images and do they give evidence of remembering and imagining? These questions have been much in the

minds of certain investigators. The answers are not yet clear, accurate, and altogether satisfying, but very definite progress has been made in the determined search for information. It is known that the great apes remember persons and other objects over periods of several days and, in some instances, several weeks. Certain observations of dream behavior suggest the existence of images, but they do not conclusively establish the fact.

Those of us who have been especially intent on finding out whether any of the apes act ideationally, thoughtfully, or with insight have pursued quite a different course, for we have asked simply and persistently: Do the animals in solving unusual problems, or in adapting themselves to the demands made by their environment, act essentially as we do when we use ideas?

There are two principal ways of getting this sort of information: Either one may watch the animals in their free wild existence or in captivity, hoping that circumstances may provide the desired opportunity; or one may try to control conditions and their relation to the world so that the opportunity may be assured. The first of these methods is often spoken of as naturalistic observation, the second as experimentation. Each has its peculiar advantages and, like feeling and thought, they are supplemental rather than

mutually exclusive. The naturalist often objects that the experimentalist is constantly in danger of making his animal act unusually or abnormally, and the experimentalist retorts that the naturalist can never be sure that what he observed was other than accidental, or indeed, that what he thinks he saw actually occurred. The fact seems to be that, especially in studying the primates, the sympathetic attitude, patience, and leisureliness of the naturalist should be combined with the critical attitude and demand for rigid checks and controls which are characteristic of the experimentalist.

To illustrate these points of difference, the observation described in Chapter 5, page 76, is admirable. Madam Abreu, watching the behavior of the mother chimpanzee after the birth of a baby, ascribes to the mother peculiarly appropriate and highly adaptive action. She thinks that she saw the mother draw out the tongue of the baby, blow into its mouth, and also manipulate it in such fashion as to suggest artificial respiration and the stimulation of heart action. Considering, as he must, all of the probable disadvantages of the observational situation, the experimentalist, not unsympathetically but with an eye to the facts, asks whether Madam Abreu is positive that the mother did more than wash and clean the new-born infant in the characteristic

manner. When she was working about the little one's mouth did she actually stimulate artificial respiration, or was she merely licking the infant's face—sucking, perhaps, instead of blowing? Such questions throw the naturalistic description into a deep shadow of doubt, and only by repetition of opportunity for observation under conditions which permit clear vision and, so nearly as possible, objective record of what happens, can legitimate suspicion of mistaken observation or misinterpretation be dissipated. It is for just this reason that the experimentalist manfully endeavors to control the conditions of observation so that an occurrence may be repeated under like circumstances and the facts verified, checked, corrected.

Perhaps Madam Abreu's description combines interpretation with what she actually saw. Undoubtedly she was influenced by expectation and a sympathetic attitude toward her pets. The scientist learns to discount habitually reports of the untrained observer, even apart from truthfulness, conscientiousness, and interest. If we had nothing but such observations as have been recorded at Quinta Palatino, and similar naturalistic reports, as evidence of primate intelligence, we should be taking a great risk in stating that the anthropoid apes closely resemble man in their intellectual life. As a fact, however, experimental

methods of inquiry have been used to excellent purpose, and in the following pages it is possible, consequently, to report facts which have been well established by the independent work of several trained investigators.

Louis Boutan (7), of France, has published illuminating accounts of the mental life of the gibbon; the writer has studied intensively the ideational behavior of the young orang-utan (8); Wolfgang Koehler of Germany (6), Mrs. Ladygin-Kohts of Russia (4), and the writer (9) have obtained intimate knowledge of the behavior of the chimpanzee, and new light has been thrown on the life of the gorilla by Carl Akeley of New York (10), Mrs. Mary Bradley of Chicago (11), and Miss Alyse Cunningham of London (12).

Prior to the World War our knowledge of the anthropoid apes was chiefly naturalistic. Great contributions had been made to the literature of life history, habits, behavior, and mental traits, but the information was fragmentary, of very unequal and uncertain value, and it always left one wondering about the matter of reliability. Alfred Russel Wallace, in "The Malay Archipelago" (13), most interestingly portrays the life of the orang-utan. Something similar was done for the gorilla, but with far less skill and accuracy, by Paul Du Chaillu in "Adventures and Explorations in Equatorial Africa" (14). The

fourth edition of Brehm's famous "Tierleben" (15) contains an excellent general description of the anthropoid apes. These are a few of the contributions to our knowledge which are likely to appeal to the general reader.

The information of these naturalistic books, like that drawn from Quinta Palatino and from the reports of animal-trainers and the officials of zoölogical gardens, prepares the way for the study of anthropoid intelligence without definitely settling the really important questions. Let us, then, face the critical issue: How does the psychologist try to find out whether or not the ape has ideas and works with insight?

The procedure is experimental and in general surprisingly simple. The same principles seem to appear in all of the ways of testing for ideation which have been used by Boutan, Koehler, Kohts, and the writer. The experimental situation offers the possibility of reward for the solution of a definite problem, whose complexity may vary greatly but whose solution yields desired food, freedom from constraint of work, company, or opportunity to play, or a combination of these much desired conditions. The problem in every case demands adaptation of behavior to a set of conditions which may be grasped either by the senses or by memory, or by a combination of sense impressions and memory images.

In the main, the tests of ape intelligence suggest the "performance tests" which have come into common use in human institutions. There are no differences in principle; indeed, precisely the same tests may be used with apes, children, and human adults. Thus direct comparison of behavior becomes possible and very interesting conclusions may be drawn.

Boutan, who more carefully than any one else has studied the intelligence of the gibbon, tested adaptive behavior by means of puzzle boxes in which food was placed as reward. The boxes could be opened by the manipulation of simple fasteners, which were either visible on the outside or concealed. It is not necessary to describe either the experimental device or the behavior of the animal. Instead, Boutan's general descriptions and conclusions will suffice to indicate the nature of his evidence. He says there is no indication of clear prevision of the act which opens the box. There seems to be a vague idea of the necessary movements. The animal's attention is held by the food, and desire for it seems to stir the recall of the movement which has been found to be useful. Boutan believes that the gibbon's behavior indicates prevision or anticipation of the end which can be attained by opening the box. The idea of movement seems to be entirely independent of the movement

itself. From this it appears that the investigator believes his experiments with the gibbon demonstrate that it has simple ideas which function in the test situations.

The orang-utan, chimpanzee, and gorilla are promising subjects for the experimental study of ideational action, but most favorable of all, because of its agreeable temperament and its playfulness, is the chimpanzee. Perhaps this explains the fact that Koehler, Kohts, and the writer have devoted attention chiefly to it, among the great apes.

The use of objects as instruments or tools is at least suggestive of ideation. It is characteristic of man, but the more other animals are studied, the more varied the evidence becomes of their ability in this direction. When the chimpanzee is so placed that a desired object—such for example as a banana or an orange—cannot be obtained by reaching, jumping, or climbing, it may have recourse to sticks as aids. And the interesting thing is that the stick may be used in a variety of ways. Some individuals will strike with it, thus trying to dislodge the reward; others may use it as an aid to jumping; or again, they may stand it beneath the objective and, quickly climbing it, reach from it. So skilful are they in this manœuvre that occasionally an individual may climb to a height of eight or ten feet on a



From Koehler, by permission Harcourt, Brace and Company

CHIMPANZEE BUILDING A TOWER OF BOXES IN ORDER TO
SECURE SUSPENDED FRUIT



From Koehler, by permission Harcourt, Brace and Company

STICK AND BOXES BEING USED BY CHIMPANZEE TO HELP IT
TO GET A BANANA

Question: Will the one which is using the stick also get the reward?

slight pole which rests on the ground or floor of the cage without other support. It takes an accomplished acrobat to do this!

Both Koehler and the writer have seen young chimpanzees use persons instead of sticks as aids in reaching the fruit. The common method is to lead or drag a person to a point nearly beneath the object and then to scramble to his shoulder and to reach from it. Koehler reports the amusing incident of an assistant who, when being used in this way by a chimpanzee, stooped over just as the animal was about to grasp its coveted prize. Thus thwarted, the chimpanzee, chagrined and irritated, dropped to the ground and tried hard to push the man into an upright position. The combination of resentment, anger, eagerness, and determination to get the coveted object is described as ludicrous.

The writer, in testing a young orang-utan, presented another type of situation which gave opportunity for the use of a stick. A long box, just large enough in diameter to admit the arm of the animal, was securely fastened to the floor of the cage. Remote from the box were two sticks, either of which was long enough to reach through the box. When everything was in readiness for an experiment a banana was quickly placed in the middle of the box, the lid closed and securely fastened, and the orang-utan given opportunity

to try to get the fruit by such device as it might command. Since the banana was beyond arm's reach, the only possibilities obvious to the observer were either to break the box open or to use one of the available sticks to push the banana out. The orang-utan tried the first method, to its entire dissatisfaction. It then had recourse to the stick and with fair directness and definiteness used it to get the reward. Similar tests have yielded positive results with the young chimpanzees also.

Koehler tells of the use by young chimpanzees of a short stick to pull in a longer stick, which in turn was used to reach a desired bit of food. This of course is a very much more complicated procedure than the use of a single stick, and presumably indicates corresponding complication of experience. But still more significant, and more surprising to the experimenter, is the use of two sticks as one. The writer has never tried this particular test, but Koehler records that one of his chimpanzees, when provided with two pieces of bamboo, the one of smaller diameter than the other and neither long enough to reach the reward which lay outside the cage, after some futile effort succeeded in fitting the smaller stick into the larger, fishing-rod fashion, thus either accidentally or intentionally constructing an adequate tool which was used promptly and ef-

fectually. A variation of this same experiment yielded even more surprising results. In this case the smaller stick was somewhat too large to fit into the larger one. Having discovered this fact, the animal chewed off the end sufficiently to enable it to fit the two pieces together. These tests indicate some ability to construct or adapt a suitable tool.

Many other interesting and important variations of the stick experiment have been tried, sometimes with positive, sometimes with negative results, for there are marked individual differences and an animal which succeeds in one test may fail utterly in another. Even in this they are not unlike us.

Especially Koehler has used a type of test which he calls the *Umweg* or roundabout-course test. This involves finding something hidden which must be either remembered or otherwise represented. A simple example is the case of taking the animal into a room by a route with which it is entirely unfamiliar or only partially familiar, and allowing it to see a banana thrown from the window. Adaptive behavior necessitates following a path, to get the banana, which is dictated by some sort of memory or idea of its location. It is known that the dog can do this, within limits, and it has been demonstrated that the same is true of the chimpanzee.

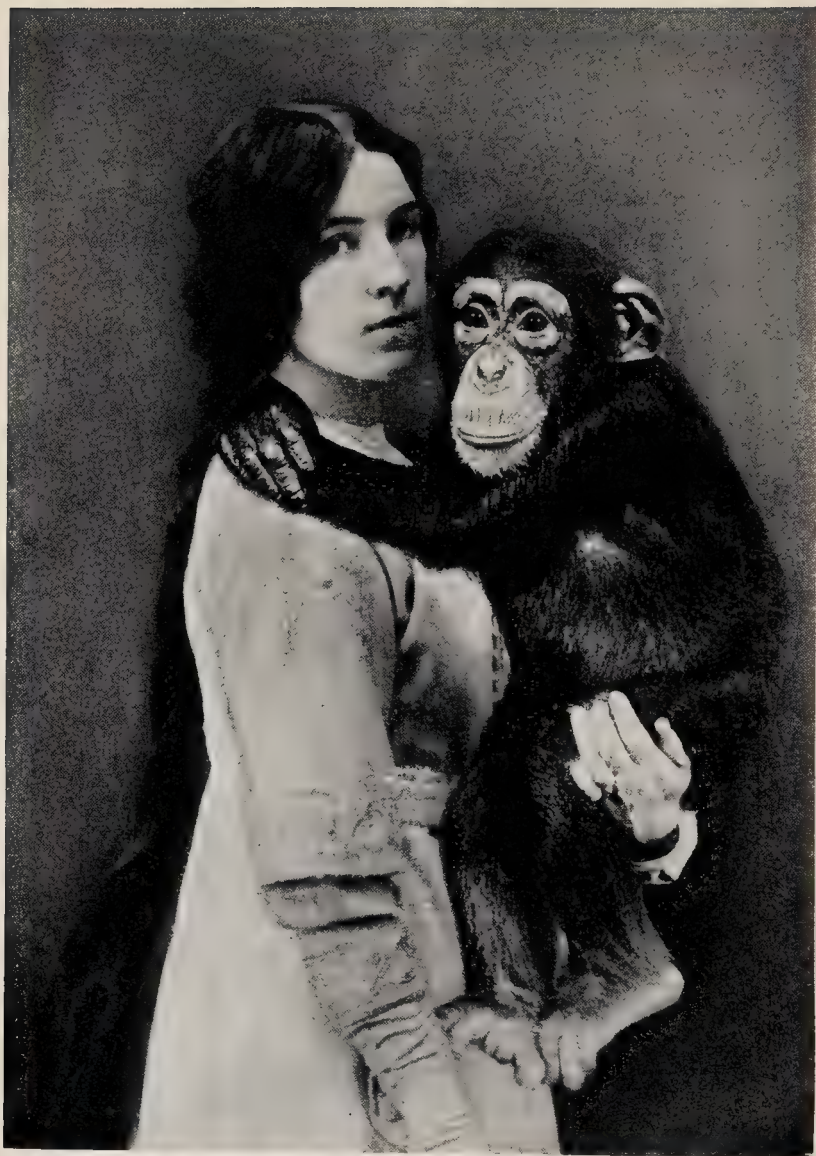
Somewhat similar is Koehler's test in which the object to be used as a tool is hidden from the animal. For example, a ladder or a pole, instead of being in the cage and within sight of the reward, was placed in the corridor through which the animal was led to the cage for its test. The point, of course, was to discover whether the animal would notice the ladder and, on discovering its need, recall and return for it. This actually happened in some instances.

Similar in many ways to the stick tests and their variations is the use of objects with which to build. Both the chimpanzee and the orangutan will drag a box or other similar object beneath a suspended banana in order to climb upon and reach from it. The use of two or more boxes placed one upon another is a wholly different matter, yet in this test, as well as in the simpler one, some apes succeed. Again, Koehler and the writer have observed young chimpanzees, without any assistance whatever from their companions or from the experimenter, suddenly abandon an attempt to get the reward from one box and place a second box on the first, thus achieving sufficient elevation to get the reward. Once the box-piling idea has appeared, the animal will stack boxes indefinitely. Some of Koehler's pictures show as many as four in series and a



By permission of Mrs. Kohts

IONI AND MRS. KOHTS IN THEIR LABORATORY, MOSCOW, RUSSIA



By permission of Mrs. Kohts

MRS. KOHTS AND HER CHIMPANZEE IONI

number of chimpanzees coöperating in the task of building.

Oddly enough, when the young chimpanzee is trying to reach a prize by this process of building, it often will use quite inappropriate objects, such as blankets or other things which will not hold their shape satisfactorily. Analogous to this behavior is the tendency to throw things toward the reward if it cannot be reached with them. I have seen a young orang-utan seize a box from which it could not reach the suspended banana and, holding it from the floor as high as it could reach, try to climb upon it in mid-air.

Mrs. Kohts trained her young chimpanzee to match sample objects. Thus by a very simple method of experimentation she was able to demonstrate the animal's ability to distinguish objects which differed in color or in degree of lightness, size, shape, and other respects. These different characteristics, of course, had to be studied separately. The experimenter, when the animal had been thoroughly trained to this procedure, held out a sample object and the animal, looking at it, selected from several objects on the table before it one which was identical and handed it over. In this type of experiment the animal showed a certain limited power of generalization. It not only got the idea of match-

ing the sample, but it learned to concentrate on certain characteristics of the objects to the neglect of others. Thus if the color green were to be matched, difference in shape, size, weight, brightness, and lightness would not necessarily confuse it.

When Mrs. Kohts tried to find out how long the visual impression or image of the sample could be held in mind, she discovered that up to fifteen seconds after the sample was removed from sight the chimpanzee could match it successfully, but when the interval was much longer he usually failed. Such evidence as we have seems to indicate that the child who cannot yet talk does not succeed after a longer interval of delay than does the chimpanzee. As adults we are able to hold the memory of the sample indefinitely; not so, apparently, the human infant and the anthropoid ape. Mrs. Kohts's line of inquiry certainly will be followed eagerly by other investigators, for the comparison of man and ape in delayed reactions is sure to yield exceptionally interesting and significant results.

Sustained effort to study ideational behavior under rigidly controlled experimental conditions was made by the writer with a young orang-utan. Because of its complicated nature the experiment cannot be described in detail. It involved the selection of one object from among a series of

identical objects, the one to be chosen being distinguished by the presence of a reward. The object which would yield reward was defined by the experimenter in terms of its spatial relation in the series; as for example, the middle object of the series; the first object to the left of the middle; the first object to the right of the middle; the first at one end of the series; or alternately, the first at the left end and the first at the right end. In the experiment some one definition, such, for example, as the middle object of the series, was chosen and consistently adhered to, so that the animal time after time was given opportunity to choose from a variable group of objects, the right one of which always bore precisely the same relation to the others; for example, the middle object. The question to be decided experimentally was whether the orang-utan could discover the correct and only basis for choice, namely, the relation of middleness.

In this experiment two monkeys, as well as the orang-utan, were used. Each monkey succeeded in solving within a few days two such problems as have been mentioned. The orang-utan, however, worked day after day with no indication of improvement. He exhibited extreme discouragement and reluctance to work. Nevertheless, for the reward which he ultimately got, often after a great many wrong choices, he persisted in his

efforts. The problem on which he worked was the selection of the first object at the left end of the series. It must be remembered that this might, in each succeeding trial, be a different object, since the total number of objects varied from trial to trial. On the twenty-third day of work in this experiment the orang-utan made more mistakes than usual and gave no signs of approaching solution of the problem. The next day he chose correctly every time. In some mysterious way he had solved the problem overnight.

Whereas the monkeys learned gradually, the orang-utan solved his problem suddenly. The difference in behavior and in the curves of learning suggest the question: Is this a matter of contrast between learning by gradual elimination of errors (trial and error) and learning ideationally with insight? Results of many experiments subsequently made by both Koehler and the writer with chimpanzees virtually confirm the conclusion that the orang-utan solved his problem ideationally. Unfortunately, no one has yet tested the chimpanzee by this method, but such methods as have been used by the observers whose work this chapter presents have revealed cases of the sudden solution of problems.

Success in solving a problem is not the only possible indication of insight. Indeed, it may be achieved without insight, for there are several



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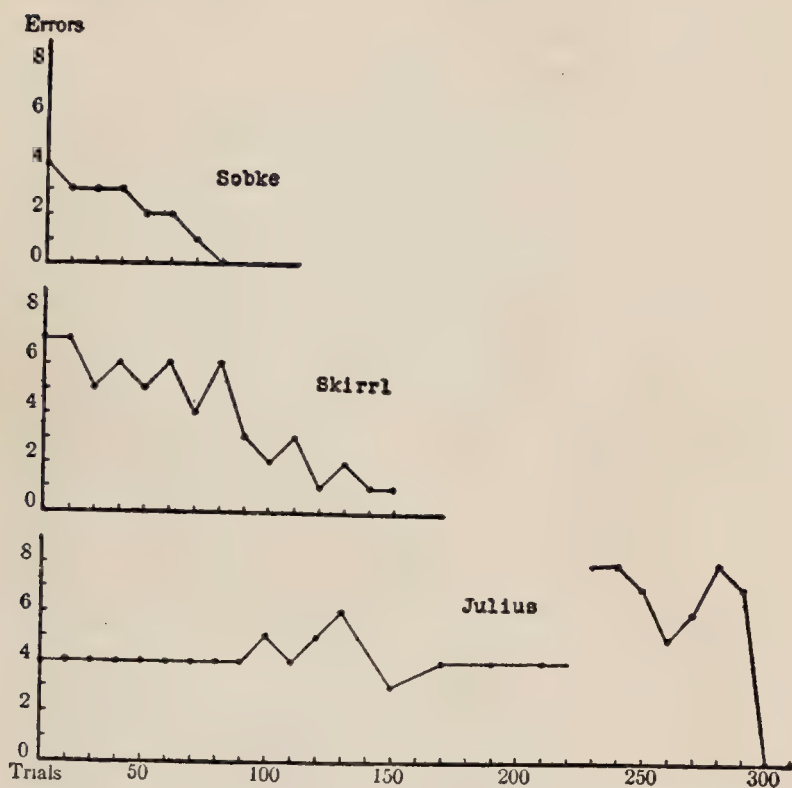
IONI MATCHING COLORS



By permission of Mrs. Kohts

IONI MATCHING A SAMPLE OBJECT

known methods or manners of acquiring habits and adapting to situations. Years ago it was



"CURVES OF LEARNING FOR MULTIPLE CHOICE PROBLEM"

shown that some mammals often, if not usually, solve novel problems by the selection of useful acts from among a multitude of random or imperfectly directed movements. This has been called learning by trial and error. Success is apparently accidental, but where a movement yields a desired result it tends to get itself re-

peated, whereas useless movements gradually disappear. Probably this method of adaptation, or of learning to meet problems effectively, is common in all animals, but certainly it is supplemented by ideational learning in us and probably also, as will now be indicated more pointedly, in certain of the anthropoid apes.

Behavior with insight is discovered rather by its characteristics than by its results. This seems to be equally true of man and chimpanzee. The child, standing before a problem box which it does not know how to operate, examines it intently with a puzzled air, suddenly smiles, looks relieved, and immediately attacks the mechanism in so definite and direct a way that understanding is evident. Insight comes ordinarily as a flash, not slowly and with sustained labor.

It remains to direct attention to significant features of the behavior of the chimpanzee as it works in such tests as have been described. First in importance is the nature of attention. When confronted by a compelling problem, the animal often, although not uniformly, directs or focuses its attention on the situation and in turn on its conspicuous features or elements. I have seen a chimpanzee sitting motionless while it carefully inspected or sized up the situation of which the problem was a part. Sometimes attention would be concentrated on the reward and

its immediate surroundings for several seconds, and often the reward itself would be kept in mind even for minutes. This degree of direction and concentration of attention is unusual in animals and it inevitably suggests thoughtfulness. To be sure, the apes, like the monkeys, are quickly fatigued by sustained attention and soon become discouraged if they do not succeed with their problem. Sometimes when annoyed by failure, they will yawn persistently; at other times they will become angry and vent their rage on whatever happens to be within reach. In all of these attentional respects they are very much like the young child.

The activity of the animal, when it strongly desires to solve a problem, may be definite and persistently followed. At times there appear series of acts, the parts of which are performed with obviously predetermined relation to the end result. The action-pattern in this case appears to be determined by the reward which the animal has in view, and from the outset it performs the unit acts as though they were elements in a whole which, as Koehler remarks, is greater than the sum of its parts.

It has also been noted that a method of attempted solution of a problem which is not successful may be abandoned suddenly and utterly for another sort of activity which is seemingly

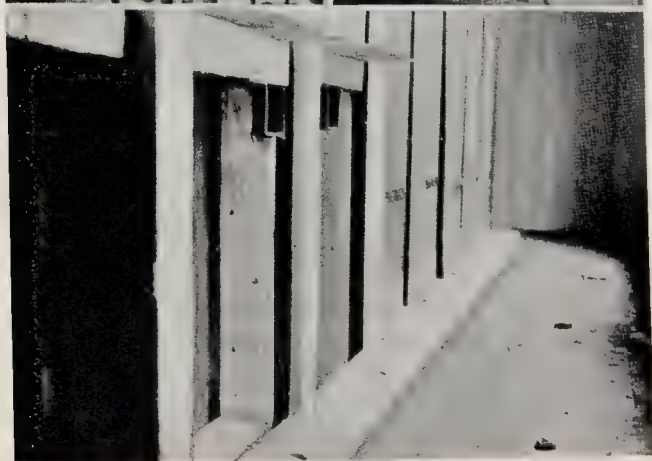
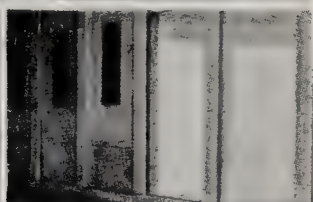
quite independent and has in common with the first only its possible relation to the goal. At times such sudden change in method indicates discouragement, but quite as frequently it is, instead, the trial of a new series of acts which may prove successful. Significant and impressive is the pause which at times occurs between activities. Frequently I have seen a young chimpanzee, after trying in vain to get its reward by one method, sit down and reëxamine the situation as though taking stock of its former efforts and trying to decide what to do next. Usually this pause, for what looks amazingly like consideration or reflection, is followed by an especially vigorous and determined attack on the problem.

More startling by far than the quick passage from one method to another, the definiteness of acts, or the pauses between efforts, is the sudden solution of problems. All who have studied experimentally the adaptive behavior of the great apes have noted this characteristic. Frequently, although not in all individuals or in all problems, correct and adequate solution is achieved without warning and almost instantly. It may have been preceded by the trial of ineffective methods or by such trial and periods of quiescence. But in the end success has been achieved with a suddenness that brings vividly to mind our own adult experi-



PORTRAIT OF JULIUS THE ORANG-UTAN

He probably was about five years old



YERKES MULTIPLE-CHOICE APPARATUS, AS USED
FOR PRIMATES IN MONTECITO, CALIFORNIA

ences of insight and the behavior of the child when it sees through a problem.

In this case seeing is believing. It is next to impossible to describe adequately the behavior of the ape in solving some novel problem. If one judges merely by the result, one has only a fraction of the significant signs of insight. Those who long have studied animals which learn only by the method of trial and error can scarcely be expected to believe the statements of this chapter. Yet if one sums up as objectively as may be the results of the observations and conclusions of the several psychologists who have diligently studied the behavior of the great apes, he must inevitably say that the evidence for the solution of problems ideationally is now both abundant and convincing. The behavior of the chimpanzee speaks for degrees and kinds of insight or understanding which so illumine the test situation as to render it immediately soluble. But it must immediately be added, with emphasis, that there are gifted and stupid individuals among apes as among men; there are good and bad days; favorable and unfavorable conditions both within and without; and above all, there are natural and unnatural experimental situations. The latter may be of such character that it is wholly unreasonable to expect the animal to succeed.

Sharper contrast it would be difficult to imagine than between the relatively blind and seemingly purposeless trial and error activity, which has been described by Thorndike as typical for the cat when it faces novel problems, and the definitely directed and apparently thoughtful behavior of the chimpanzee. The answer to our principal problem has been given. The great apes exhibit ideational behavior; they act with insight. It remains for further patient, critical research to analyze this behavior more adequately and to compare it with our own action under identical conditions.

CHAPTER 7

AFFECTION, SYMPATHY, AND RELATED SOCIAL EXPERIENCES

FOR the purposes of this story it is sufficient to treat the emotions and social relations in two groups: those which are directed primarily toward other individuals or objects—otherward feelings—properly called the tender emotions, and those which are directed selfward and might well be thought of as the tough emotions. Conspicuous in the former group are feelings of affection, sympathy, and pity; in the latter anxiety, fear, anger, rage, resentment, and hatred. Intermediate but more often appearing in connection with the tender emotions is jealousy.

Now, it happens that the primates exhibit in varying forms the principal types of emotion which appear in man. From the monkeys to the great apes they become more and more strikingly like human expressions, so that with some of the types of monkey and especially with the great apes we gain an almost uncomfortable feeling of kinship. It is not at all surprising that scientists should feel that the chimpanzee is more nearly

human in its emotional life than in any other way. Madam Abreu's interest and attitude indicate a similar conclusion.

As in the previous chapter, observations from Quinta Palatino are in point as illustrations of the tender and related emotions in the great apes.

The conclusion of the story partially related in an earlier chapter about the escape and recapture of Chimpita and Cucusa is as follows: Chimpita, having taken from the guard the chain with which he was to be bound and thrown it away, took safe refuge in a mango-tree and refused to come to his keepers. "So," says Madam Abreu, "I went to the tree and, speaking to him, pretended that I was injured in the arm and suffering. Immediately, on seeing that I was in trouble, he jumped from the tree, and coming to me held my arm and kissed it strongly. And so we were able to catch him."

Of similar import is this tale of the chimpanzee Mimosa who, oddly enough, acted as nursemaid for Cucusa and took care of the baby Anumá: "One day when she was left alone in the cage with the baby, she opened the door and, taking Anumá, went away. A negro servant who went to seek the animals found them eating vegetables in a garden. Instead of running to try to capture Mimosa, he talked to her, at the same time pretending that he was lame and could not run after

her. The animal looked at him inquiringly, then came and permitted him to put the chain on her."

Madam Abreu has many and varied stories of the affection and sympathy of the animals for her and other persons whom they like. These stories, although they may not convince the skeptic, surely are indicative of the quality of mind and social relations in these creatures.

Speaking of the more lowly primates, Madam Abreu remarked:

"My first monkey, a full-grown female macaque, was very affectionate with me, but also very jealous of me. I think jealousy in the monkeys depends rather on the make-up of the species or the individuals than on the sex. Jealousy and vengeance are the two capital sentiments with monkeys, but this is not true with chimpanzees, for in them disinterested affection and sympathy are often seen."

The story has been told of the baby baboon who tended and fed his sick father. Quinta Palatino supplies many other interesting incidents from the affective life of these somewhat unprepossessing monkeys. In their family life, certainly, they show affection between parents and offspring; yet the male is notoriously jealous of his mate, and as their owner relates, speaking of one individual in which this behavior was particularly striking:

“The baboon always conceals his wife when any man approaches his cage. I even had a priest come to test whether he would be able to tell the difference, since the priest wears long robes like a woman’s dress, but the baboon knew the difference.”

This is merely an extreme instance of a type of behavior which may be observed almost any day among the baboons, monkeys, and, in less degree, the great apes of the Abreu collection.

Caged together were a pair of baboons and their several-months-old baby. For some time it was observed that the father was unkind to the baby, treating it roughly and occasionally biting it. Presently this became so serious that the little one’s safety was in danger, so it was taken away from the parents and placed in a cage by itself. A little while later the male was one morning discovered to have lost an eye, apparently by having it torn with teeth or hands by his companion. No one saw the accident, but there was nothing in or about the cage except the other animal to stand as cause. Previously the male had been aggressive and domineering, now he was meekness itself, and the female became ruler of the cage. When the animals were fed she took all she wanted before giving him a chance at any.

This incident, in Madam Abreu’s opinion, exhibits the emotion of affection, especially as be-

tween mother and child, of jealousy on the part of the male, and of vengeance on the part of the female, for she believes that the mother, being distressed and angered by the ill treatment which her offspring received from its father, resented his behavior, and that after the baby had been taken away from them, she avenged her wrongs by tearing out his eye. No one can guarantee the correctness of this interpretation, but the more intimate one is with the daily life and social relations of these creatures the better qualified he should be to understand and interpret their behavior. Other comment would seem futile. The facts are presented not merely for their immediate value to the reader but to suggest problems for further inquiry—questions of fact and interpretation which are capable of definite and accurate determination.

The attachment of the female primate to her young has often been observed and recorded. Parental emotion is more impressive in the primates than in any other type of animal, and increasingly so from the lower monkey-like animals to the great apes. No monkey mother will ordinarily allow a baby, even though it be dead, to be taken from her or to be removed from the cage. The writer has himself observed this and he has verification of the essential features of behavior from other persons. There are several

experiences at Quinta Palatino which are pertinent. One only may be related:

“When Cucusa’s second baby was born, Anumá was about three years old. With the baby he was gentle and affectionate as could be, taking care of it and playing with it without interference from the mother. When the mother became ill the baby was affected and shortly died. Cucusa would not let us take away the baby, so I contrived to put a cord around its neck and to conceal it so that the mother should not notice anything unusual. Then I began to play with Cucusa, to caress her, and to divert her attention from the little one. When I saw my opportunity I signaled to my helpers and they, jerking the cord, pulled the body of the baby from Cucusa’s arms. She was not holding it very tightly, so we succeeded in this way in getting it from her. She cried and cried and I did my best to console her.”

It is frequently related of monkeys and apes that they have good memories, especially for persons and objects that have injured or offended them. Many are the stories of delayed vengeance or revenge. But on the other side of the ledger are memories such as the following, which we owe to Madam Abreu:

“Once when I returned to my home from France, I had been away from my monkeys for many months. When I arrived at Quinta Pala-



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SERIOUSNESS IN THE GORILLA

The gorilla and the orang-utan appear to take life's problems much more seriously than does the chimpanzee



Courtesy of Mr. Lee Russell

CHIMPANZEE PREOCCUPATION

This domestic scene is not intended as an advertisement of Klim! The little animals Chien and Payson were curiously attracted to the natural beverage that it seemed appropriate to associate a Klim-can with them.

tino the animals screamed so that I could scarcely bear it. Cucusa, who was there, did not recognize me at first. For a while she looked at me intently. Then suddenly she jumped to me and caressed me.”

That affection and jealousy are intimately associated in the primates is well known. Many instances have been reported of monkeys and apes, because of jealousy, biting their keepers or others of whom they are fond. This has been observed several times by the writer as well as by Madam Abreu, who has herself repeatedly suffered from this natural weakness in her pets. To give attention to one member of a family to the exclusion of another may be quite sufficient to provoke uncontrollable jealousy. One day at Quinta Palatino a young lady who was fond of monkeys and evidently well liked by them, was petting a tame, gentle, good-natured male capuchin. Suddenly a little female which was supposed to be no less gentle and friendly, bit her hand. Afterward she would not look her victim in the eye. Such behavior is common, but often its causes and conditions are unobserved or misunderstood, and what is primarily an expression of jealousy is attributed to anger or maliciousness.

The great apes, apparently, are quite as subject to jealousy, at least early in life, as are the monkeys. Frequently they will strike or bite

their friends because of what must appear to them slights or neglect. I recall vividly a little boy playing with a pair of chimpanzees not more than three or four years old. Both were friendly, but the male, being more active and playful, monopolized the boy's attention. Suddenly the little female, who had been sitting at one side neglected but watching intently, rushed at the boy when he came within reach and bit him on the hand. When punished, she received the discipline meekly and without apparent resentment.

The great apes, and indeed also the monkeys, appreciate kindness and develop varied ways of expressing themselves. We may consider especially those of the chimpanzee. In these animals love and sympathy, resentment, fear, and delight and joy are registered by facial expression, attitude, and action. The chimpanzee smiles and also laughs, thus clearly indicating even to the casual observer his satisfaction. Expressions of joy are most common in play; yet the animal may smile or laugh when tickled, or when offered food to which it happens to be especially partial. Any day at Quinta Palatino one might register in memory or on a photographic plate the facial and bodily expressions of several of the principal tender emotions.

Impressive indeed is the thoughtfulness of the ordinarily care-free and irresponsible little chim-

panzee for ill or injured companions. In the Abreu collection there was for a while opportunity to observe the social relations of three individuals whose age certainly was not above five years. In the same cage were a little male and two females, one of the latter mortally ill. She was so ill that much of the time she lay on the floor of the cage in the sunlight, listless and pathetic. There was excellent opportunity to observe the attitude of her lively companions toward this helpless invalid. In all their boisterous play they scrupulously avoided disturbing her, and, in fact, seldom touched her as they climbed, jumped, or ran about the cage. Now and then one or the other would go to her and touch her gently or caress her; or again one of them, fatigued or worsted in some game, would obviously seek refuge and respite by going close to her. In this position safety from disturbance was assured. A certain solicitude, sympathy, and pity, as well as almost human expression of consideration were thus manifested by these little creatures.

Perhaps in the same connection the story of Mimosa, the chimpanzee nursemaid, is significant. It will be recalled that this mature female took care of a baby not her own, and apparently treated it with affection and devotion.

Many indeed are the examples of sympathetic relations among themselves that this unique col-

ony of primates has offered. More cannot be cited here.

Of instances of sympathy with persons there is no lack. The following story serves at once to illustrate individuality of temperament and sympathetic behavior:

“I was traveling on the sea. My chimpanzees Chimpita and Cucusa were with me and also my negro servant Andres and his wife. She was very seasick. I brought the chimpanzees into her cabin. The male sat entirely quiet, without making any disturbance. He watched the sick woman and seemed to feel concern for her. But Cucusa paid no attention whatever as she played about the cabin.

“And,” adds Madam Abreu, “I have never seen a chimpanzee seasick.”

Temperamental differences between individuals are everywhere noticeable. Yet too often it is impossible to know whether these differences are attributable to species, sex, or age, for it is rarely indeed that the observer knows the animal's age in addition to its sex, and can safely characterize the species. It is fortunate that in the Abreu chimpanzee colony are three individuals about whom much, although not all, that we might wish to know is known. They are Jimmy, the old male, Anumá, his nearly mature son, and Lita, his little daughter. Ten years ago Jimmy was described

by an unprejudiced anthropologist as "irascible and wild." Anumá, then a new-born infant, might now be characterized as good-tempered and tame. Although one might naturally expect two grown males to exhibit hostility, Jimmy and Anumá seem to be on the best of terms. We are told that once when Anumá accidentally escaped from his cage, to the horror of his keepers he went immediately to the cage of Jimmy and sought an interview! Instead of attacking him viciously as had been feared, Jimmy accepted him as a long-absent child and treated him with the utmost friendliness and with such expressions of affection as are appropriate to a somewhat morose and stolid male.

Jimmy in essential respects, is the wild male of the species; Anumá, the domesticated. The latter, like some people, seems to be interested in almost everything human; but his father, if perchance interested in man and his doings, scorns to show his concern. It is almost unbelievable that Anumá should in a score of years become a counterpart of his father. Yet no one knows what age or untoward conditions of life might do to alter his disposition and his uniformly friendly attitude toward humanity.

As one observes these two specimens of great ape in their daily cage life, he inevitably falls to wondering what might happen if Anumá's domes-

tication were continued for several generations. Would or would not this almost human type of ape become a thoroughly docile creature and a willing servant of man? Surely the contrast between Anumá and Jimmy is encouraging. Anumá is not malicious. It is told of him that he once bit Andres severely, but when whipped for this offense by Madam Abreu and Andres, he took his punishment without resistance or evidence of resentment. How fascinating would be an accurate record of the life history of this animal! Never before, it is entirely safe to say, has a chimpanzee been brought up under conditions so favorable to physical and mental development and healthfulness. Yet Anumá does not talk, and his accomplishments, despite his ten years of intimate association with devoted human attendants, barely equal those of the average two-year-old child.

The infant ape, or at least the infant chimpanzee, might almost be thought to have taken lessons from some of its human contemporaries. Of the baby Lita, Madam Abreu says:

“When I did not put sugar in the baby’s milk she would not take it and tried to throw away the glass. Then when I put in some sugar she took it and offered to give me a kiss to thank me.”

Such behavior instead of seeming almost human might very well be human. Certainly many persons unfamiliar with the great apes will doubt the

facts. The writer, having himself observed strikingly similar behavior in young apes and knowing full well that they are capable of precisely such emotional expressions as Madam Abreu describes, accepts her statement with assurance of its correctness. It is entirely characteristic of the chimpanzee baby and adolescent to exhibit dislike, disapproval, or resentment, and on the other hand approval, delight, and appreciation. Whether responding to their parents or their human friends and attendants, they act out their feelings fully and frankly. To what extent their expressions of emotion may be influenced by human association we cannot at present say. But the probability is that the essential features of the expressions are characteristic of the species and that if to any considerable extent the animals ape man, it results merely in minor modification of emotional activity.

Intimately related to the story of little Lita is Madam Abreu's account of various ways in which her animals express their dissatisfaction with her or with the treatment which they receive.

A common mode of expression is self-injury. The adolescent female chimpanzee Fiffille, to whom her owner is exceedingly partial, seeks always to take advantage of this fact by insisting on getting just what she wants to eat, and that promptly. To command attention and whatever

else she desires, she has developed the habit of beating with her side or back against the wall of her cage. Fru Fru, when provoked or disappointed, has been seen to strike her forehead on the wall or floor of her cage. These Abreu observations can be matched not only from the experience of the writer with chimpanzees and orang-utans but from records of child behavior. A young orang-utan, under systematic observation for ideational behavior, when bothered by a problem or unable satisfactorily to meet the requirements of the situation, often would strike his head repeatedly and rather hard against the floor or wall of the room. In the same experiment a boy of some seven years who was having difficulty with one of the problems struck his forehead several times against the wall, at the same time remarking somewhat apologetically that he must stir things up.

Quite similarly young chimpanzees have been observed both at Quinta Palatino and elsewhere to beat the ground or floor of their cage with hands or feet or both when they were dissatisfied, anxious, or fearful. On some occasions this is seemingly done to attract attention, again to drive or frighten away disturbing objects. It may even be a preliminary to mock fighting.

Yet another common method of expressing dissatisfaction is to drop to the floor and, whirling

about, scream loudly. This is a manifestation of dissatisfaction which, although appearing often when desired food or caresses are withheld, suggests rather the tough than the tender emotions.

It remains to exemplify certain of the tender emotions by noting the family life and relations of Jimmy, Monona, and Lita. The three for nearly two years have lived together harmoniously in a large outdoor cage. It is divided into two parts by a sturdy partition and on occasion Jimmy has to be isolated in order to protect Monona and Lita from over-excitement and possible injury, for the old male, always self-assertive, is sometimes grossly domineering. From time to time and especially when male visitors approach the family domain, he breaks into a tantrum, growling, yelling, rushing about the cage, shaking things violently and threatening Monona. Putting together the facts about jealousy and modes of self-assertion already mentioned, one might safely assume that Jimmy's violent spells are caused partially by jealousy. He has never been seen actually to injure either Monona or Lita, but the fear which his behavior induces in them naturally more than justifies the keepers in isolating him whenever he becomes violently demonstrative.

Ordinarily the family life is tranquil and, judged by human standards, uneventful. The father is the progressive member of the group, the mother

the conservative, and the baby the venturesome. Both father and mother look to the welfare of their offspring. He seems to be charged especially with the duty, or privilege, of amusing and exercising the little one; she with watching over it, protecting, and supplying it with food.

It is not strictly true to say that the father plays with the baby and the mother takes care of it, for both on occasion may indulge in games, yet it seems reasonably well established that Jimmy more frequently plays with Lita, and also in more varied ways than does Monona. Perhaps if Jimmy were younger he would be more active and boisterous in his games. As it is, they ordinarily involve little activity on his part, although they may entail a great deal for Lita.

The baby is much more friendly with human visitors than either her father or her mother. Her attitude is frank and trusting. But as she plays with persons beside the cage, either her mother, her father, or both, watch intently, ready to rush to her assistance if she is threatened with harm. It would seem, from all that has been learned about chimpanzees by Madam Abreu and all that the literature affords, that this is a typical family. If it were resident in the wilds of Africa, there probably would be other children in the group, for it is well established that family relations are long maintained.

Of real generosity, instances are not abundant in Madam Abreu's colony; yet they do appear, and most frequently, it seems, in parental and family relations. Jimmy, for instance, usually does not interfere with the food of Monona and Lita. Doubtless this is in part due to experiences for which his keepers are responsible. Anumá, going still farther, has been known to give up to his female companion, Miñita, a piece of fruit of which he is very fond. The little female was seen to beg for the food and Anumá to hand it to her. Whether this is characteristic of the male of the species in relation to the female, or whether Anumá's partial domestication has altered his chimpanzee nature, one may not say. Certainly, if such behavior is common among the great apes, it must command our admiration and justify us in speculating about the possibility of highly developed and variable forms of social relations among what may be "our contemporary ancestors."

As one studies primate life at Quinta Palatino, observing now the behavior of adult apes, now that of infants or adolescents, one is increasingly impressed by the remarkable contrast attributable to age. The older individuals are much slowed up, relatively lethargic, stolid, inactive sit-by-the-fires, whereas the younger specimens are almost incessantly active. Play appears to

be their business in life. One of the large cement-floored cages is thoroughly washed out by the keeper and forthwith its chimpanzee tenants indulge in skating on hands, feet, or back. With running start they slide from end to end or side to side, often bumping into one another or dragging one another about. It is an exciting game in which sociability has a major rôle.

Rarely is there any ill temper manifested. Of tricks and mischief there is no lack, but even when slight discomfort or injury results from the boisterous activity, it is not seriously resented. These statements of course apply to happy families, which means, among other things, that the animals are of somewhere nearly the same age and size, and belong to the same or closely related species or type. Friendships develop and marked preferences which sometimes interfere with the even course of social relations, since partiality inevitably fosters jealousy, and that in turn tends to gain expression in peace-disturbing ways.

Inadequate though it be, this picture of the tender aspect of the emotional life of the monkeys and great apes may give the reader reason to pause and reflect. Are we humans after all so nearly unique in our flaunted altruism? Are not the fundamentals, and even the essential qualities, of our unselfish feelings and actions existent in organisms which we too long have neglected to



APING HIS HUMAN COMPANIONS

Little Chim, here shown sitting in Rock Creek Park, Washington, D. C., book in hand, was very much interested in the book-handling habit of his human friends. Again and again he was seen to take a book and turn the pages carefully and neatly one by one, as though trying to discover our satisfaction in the operation.



NOTHING BUT LEAVES!

As Chim was being posed for this photograph in Rock Creek Park, he pulled a bunch of leaves from a nearby bush.

study, and too often regarded with abhorrence or disgust? After all is said, the truth alone is worth seeking. Our desires, prejudices, and preferences are negligible and indeed often negatived by it. Perhaps the Abreu adventure in the rearing of primates may help to lift us somewhat above ourselves and enable us to see more clearly certain facts which bear on genetic relations, on education, and on social evolution.

CHAPTER 8

FEAR, RAGE, RESENTMENT AND HATRED

WE are now to consider emotions which are coupled with aggressive or defensive behavior. They may have altruistic ends, but they are more likely to be associated with selfish modes of response. In animals as contrasted with man they are likely to be somewhat more conspicuous and impressive than the tender emotions and to give an unwarrantable impression that they are stronger, more frequent in occurrence, and play a more important rôle in the life of the animal than the latter. This impression is corrected by continued observation and intimate acquaintance with the daily life of the animals. It is the natural result of the circumstances which usually attract human attention to animal behavior. Nevertheless, it is too obvious for discussion that fear, anger, and related emotional responses are both common and important throughout the order primates. We shall contend merely that they are neither more nor less so in other primates than in man.

As illustrating anger, resentment, and seeming repentance in monkeys and apes, Madam Abreu presents the following observations:

The chimpanzee Chimpita, she states, became much interested in a "blonde cook" at Quinta Palatino whom, from his cage, he could see at work in the kitchen. As the interest became disturbing, it was decided that the door should be screened. The screen was put up by a man who up to that time had been one of Chimpita's close friends. The animal saw him put it up. A few days later the man went to take Chimpita from the cage for a ride on his bicycle. As they passed the kitchen door the chimpanzee stopped and tried to look in. The man scolded him and commanded him to go on. Chimpita obeyed. When they returned to the cage the man went in to loosen the chain which was always placed on Chimpita when he was taken out for exercise. He closed the door behind him when he entered the cage. As soon as the animal saw that he was free he jumped at the man and attacked him viciously. The man was very quick and adroit and succeeded in holding the animal off from him until help came and he was enabled to escape. He had a revolver with him, but refused to use it. Before this incident, as has been stated, Chimpita was fond of this man, but thereafter he would not look him in the eye. When the man would ap-

proach to pet him or try to give him food, he would neither eat the food nor look at him.

This is clearly enough a case of anger and resentment provoked by interference with strongly affective action. Whether or not the later behavior toward the man indicates resentment, is by no means clear. Possibly it indicates instead smoldering resentment coupled with fear.

A similar story is told of a little monkey which had been brought to Madam Abreu by one of her friends to be kept for her. This lady was one day feeding the monkey and in doing so neglected to feed another monkey which was at hand and which belonged to Madam Abreu. The latter animal became angry and bit the lady's finger. She, however, being familiar with animals and fond of them, went to it as soon as her wound had been dressed and tried to make up with it saying: "Why did you bite me? You were right, I was wrong. I did not give you anything to eat. Come, I will feed you." But the animal would not take food from her and refused even to look at her.

Behavior similar to this may be observed frequently at Quinta Palatino and it can scarcely be doubted to indicate the selfward type of emotional experience. Clearly the animals resent neglect quite as bitterly as unkind treatment. Many stories are on record of lasting resentment and



JACKITO OBJECTS TO BEING BOSSED

We were trying to get a portrait of Jackito when this accident happened. Quite unintentionally he did us a good turn, for this picture shows an expression of anger and the tuft of white hair at the end of the little male's spine which elsewhere has been described as typical of the young female chimpanzee.



By permission of Mrs. Kohls

IONI REGISTERS ANGER

Mrs. Kohls surely must have had some exciting times in training this little chimpanzee to match sample objects

revenge. There are none such recorded by Madam Abreu, but there is no adequate reason to doubt the fact of memory for social relations involving the tough emotions, since it is well recognized in case of the tender emotions. Indeed, it may well be that the animals remember better those whom they consider their enemies than they do their friends. Unfortunately, we have no measure of the duration of memory.

Already in a previous chapter the story has been told of unhappy relations in a baboon family. The male, undoubtedly jealous of the baby, became cruel and vindictive. The mother, angered by this behavior and resentful, finally avenged the wrongs of her child by attacking the father. Such, at any rate, is Madam Abreu's interpretation of the behavior which was observed. The behavior itself is a matter of fact; the interpretation may be partially or wholly incorrect. But this and other incidents from Quinta Palatino well substantiate the conviction that baboons are subject to anger and resentment as well as to affection, associated jealousy, and fear.

There are various indications that both the monkeys and the apes have natural and acquired dislikes. Undoubtedly these emotional attitudes would be entirely intelligible to us if the history of the animal and its experiences were fully known. We observe that some people are wel-

comed as friends and others avoided, that one's attitude and acts toward an animal very quickly establish an emotional relation of friendliness or enmity. On this score it is peculiarly interesting to observe the quickness and the keenness of the animals in detecting courage or timidity, frankness or deception, liking or dislike in persons. They are guided, we surmise, by observation of one's acts and facial expression. The tone of voice, the manner of dress, the mode of making or receiving advances doubtless count largely in the animal's estimate of a human acquaintance.

Many times it has been observed at Quinta Palatino, and elsewhere, that monkeys and apes speedily take advantage of persons who are timid, and impose on them without limit. Once a monkey or a great ape feels that it has the mastery, whether of members of its species or of persons, it can be curbed only by fear. The animals are quite as quick to detect frankness or deceit and to respond in accordance with their interests. The same applies to liking or disliking. Childlike, they almost immediately sense the attitude of a person toward them and behave accordingly.

Experiences related by Juan Lescano illustrate what we have in mind. Señor Lescano is in charge of Madam Abreu's estate. When he first came to Quinta Palatino he set about getting acquainted with the collection of animals and win-

ning their friendship. One day he entered the cage in which the half-grown chimpanzee Malapulga was kept. Without evident provocation she bit him on the arm. Instantly, with his fist, he struck her a blow on the side of the head which sent her spinning. Her attitude changed with almost tragic suddenness and she came to him crying and holding up her arms to be comforted. He says she has never since offered to bite him.

Malapulga, it is to be remembered, has an unusually disagreeable disposition. Her reception of Lescano doubtless contributed substantially to her bad reputation. Yet it certainly does not rest entirely upon such unhappy incidents, for even the casual observer may note that her behavior toward members of her kind and toward human visitors is markedly different from that of most of her chimpanzee companions and on the whole tends strongly to disagreeableness.

One of the most interesting problems for the biologist is the discovery of the causes or conditions for such behavior as Malapulga's. When traits of temperament and character are thoroughly understood, ways of modifying or controlling them may speedily be discovered. Then an uncompanionable person or chimpanzee may perhaps be made over according to plan. At present it is necessary to accept Malapulga as a peculiarly unattractive and uncompanionable chimpanzee.

Oddly enough, this is the case in spite of what looks like a splendid physique. She is a perfectly healthy, well-groomed, vigorous animal, but she behaves in a most reprehensibly unsocial or antisocial manner. We are sure that Lescano no less than others who have been brought into intimate relations with the little creature will agree in these reflections.

A not dissimilar experience with Monona, the mother of Lita, is reported by Lescano. He went one day into Monona's cage to give Lita some cherries. The father, Jimmy, was in an adjoining cage. When Lescano tried to feed Lita, Monona approached and bit his hand. Immediately he pursued her with a stick and punished her so that she cried. Jimmy, seeing and hearing the disturbance, beat savagely on the door between the cages and with his feet stamped the ground. Undoubtedly he would have made a vicious attack on Lescano if he could have got at him. When the whipping was finished, Lescano stood and held out his hand to Monona. She came to him and kissed it. Never since has she tried to harm him.

Lescano acted not only wisely toward the animals but in the only way which would make him, instead of them, master of the situation. Had either Malapulga or Monona frightened and forced him to withdraw from the cage, he surely

would have been attacked on his next appearance, and probably never would have been safe from their aggression. It has been observed that even small monkeys, detecting in children or adults timidity or fear of them, delight in playing upon this emotional attitude. Even if they do not bite, they will chase timid persons or other animals. This happens in the best regulated of monkey and ape families and even the most good-natured, harmless individuals will amuse themselves by assuming mastery.

The experiences of Lescano, which are cited merely illustratively and can be matched by all who have had intimate dealings with monkeys and apes, are of the utmost practical significance. If one is afraid of animals, it is wise to avoid them or to master thoroughly one's timidity, for they, like children, quickly discover one's attitude toward them and act accordingly. The relation of these facts to human behavior is reasonably obvious. Neither parent nor teacher can afford to permit a child to detect timidity, deceitfulness, or dislike; for with detection, ability to direct or control and to command respect and affection either wanes or wholly disappears.

Of the orang-utan *Cachesita*, a story illustrating fear and repentance is told. The animal one day escaped from his cage and Madam Abreu and her servants pursued him through the estate.

Being a skilful climber, the orang-utan gracefully swung from tree to tree. It seemed almost impossible to recapture him until he chose to descend to the ground, but his pursuers, following closely with sticks, frightened him and he finally came from the trees and was captured. The shouting, the barking of dogs, and the flourishing of the sticks evidently terrified him and he came to his pursuers like a culprit, and after being returned to his cage refused to look at any one. His owner believes his behavior indicated shame for what he had done. Probably his emotion was less simple, consisting, perhaps, of a mixture of fear, resentment, and shame.

Already much has been said about the dangerous old male chimpanzee, Jimmy. No one for years has ventured to approach him intimately, or even to feed or pet him except through an intervening barrier. It is Madam Abreu's firm conviction that he should not be trusted. Recently, however, she permitted a professional animal-trainer to apply his method of intimidation to both Jimmy and Anumá. The method consisted essentially in cowing the animals by rough and noisy attack on their cages, and firing, either into the air or directly toward the animal, a pistol loaded with blank cartridges. Especially significant for our interest in emotional characteristics are the differences in the behavior of Anumá and

his father Jimmy when thus approached by a strange man.

Anumá was cowed, and persistently tried to keep away from the animal-trainer by retreating to distant portions of his cage; but instead of being terrified he quite evidently was excited as well as somewhat intimidated. Frequently he screamed or yelled. The explosions startled him, but he seemed to have no deep-seated fear either of the revolver or the sound which it produced. The disturbance caused by the animal-trainer stirred him so that he rushed about the cage and exhibited in varied ways excitement and anxiety. Presently the trainer approached the side of the cage and called Anumá to him. The ape came somewhat reluctantly, took food, and then crowded up against the cage wall so that he could be petted and could return the trainer's caresses. After a time, Anumá, vigorously patting the trainer's back, opened his mouth widely, and squealed with evident delight. That he felt kindly disposed toward the man who had tried to intimidate him was entirely clear, for in addition to patting him he extended his lips and tried to kiss him.

Jimmy, when similarly approached in his remote cage, showed fear of the revolver itself as well as of the explosions and the noisy and rough attack of the trainer on his cage. He ran about seeking a hiding-place, constantly keeping his eye

on the trainer. The only parts of the cage in which he could conceal himself were sought. Whenever the revolver was discharged he seemed stricken with terror. Evidently he would have made away at top speed if he had been in the open. He also yelled loudly in response to each explosion. Although this performance was twice repeated at intervals of a few days, the animal-trainer never ventured to offer himself to Jimmy for friendly caresses as he had to Anumá. It is probable that Jimmy would have come to him for food if hungry; but whether or not he could safely have been trusted to exhibit affection rather than resentment, is difficult to say. At any rate, the animal-trainer, although he undertook the experiment with the intention of so far intimidating Jimmy that he would be able to enter his cage, did not carry out his plan.

Briefly, Jimmy in expression of fear and terror seemed the wild animal; Anumá, the intimidated domesticated animal. Jimmy is afraid even of a camera pointed toward him; Anumá shows no alarm. One can but wonder whether in Jimmy's case this is the result of experience in the wilds of Africa, or whether perchance during his life as a stage performer he was intimidated by the use of the pistol. Whereas Jimmy is easily stirred to anger, if not also to rage, and expresses himself in ways which are startling to the uninitiated

visitor, Anumá is less readily aroused and decidedly less extreme in his expressions of emotion.

Fear and anger are closely related, and a situation which induces timidity, fear, or even terror will call forth anger, resentment, or rage if the animal sees that it has the advantage or mastery. The young chimpanzee faced by an unfamiliar animal or other object whose friendliness it cannot count on, is likely first of all to show timidity by trying to retreat without attracting attention. This failing, it may stand its ground, unwillingly but with bristling hair and tense muscles, waiting nervously for developments. If the fear-evoking object continues to approach, the ape presently becomes terror-stricken, makes a wild outcry, and either attacks or dashes for liberty.

If, on the contrary, the aggressor shows signs of timidity and willingness to retreat, the animal is quick to take advantage of this change by acting as though angry. The hair assumes its normal position and the animal may beat the ground with hands, feet, or both. It may even rush forward aggressively. Thus we see fear almost instantly replaced by anger, the difference in the situations being that in the first instance the animal feels that it is in danger, whereas in the second it detects the chance for mastery. Even very small chimpanzees—and the same is true of many other animals—strive to frighten away enemies

or intruders by assuming a formidable attitude which ordinarily would be indicative of anger.

Already behavior has been described which clearly indicates dissatisfaction. The baby chimpanzee dashes to the ground the proffered cup of milk because the milk has not been sweetened, or it refuses food because given something for which it has no particular liking. Anger and rage are commonly expressed in young primates by self-injury or even self-mutilation: dashing the body about, striking the head against objects, screaming and crying, not in a helpless, pathetic way, but aggressively and with every other manifestation of extreme resentment or rage. In some cases the lips may be drawn back, the jaws opened widely, and the animal may even attempt to bite the hand that feeds it. These are tricks of the young which evidently serve the useful purpose of getting what is desired.

Such behavior is confined, so far as the writer knows, to the relations of the young monkey or ape to persons. It seems doubtful that such conduct would achieve the desired end were the young animal dealing with its parents. Cases are not on record in which the father or mother chimpanzee humors its offspring by reacting kindly to such displays of temper. On the contrary, instances have been observed in which the parent

promptly punished by a vigorous cuff or by neglect such show of infantile insubordination. Perhaps here again the great apes have lessons for the human parent.

Dominance and subordination are evident in every group of primates. Apparently there is no such thing as equality of status and opportunity. Leadership, mastery, control are manifest. So in their relations with persons, the monkeys and apes merely exhibit their natural aptitudes and types of social behavior. Ordinarily there is aggressive leadership in cage, colony, or family group. Domination may be by either sex, but dominance there must be, and instead of a single leader associated with individuals of relative equality, there is likely to be serial subordination. So that each individual secures in its social group the degree of opportunity for control and self-expression to which its characteristics and stage of development entitle it. Sometimes one wonders whether this type of social organization might not be valuable for man.

Temperamental sex and age differences in susceptibility to the aggressive or tough emotions are conspicuous indeed in the Abreu primate collection. On the whole, the males exhibit jealousy more frequently than do the females, but on the other hand the female is at least as quick as the

male to take offense at undue attention by persons to mate or cage companions; and unlike the child, the monkey, if it has courage, is more likely to express its jealousy vigorously by attack on the offending object than to sulk and nurse its injury.

Housed in the same cage are the adolescent female chimpanzees Malapulga and Sita. More strikingly contrasted temperaments it would be difficult to find even among persons. The one is antisocial, the other distinctly social. Malapulga represents the type of creature which commands allegiance through fear or not at all, whereas Sita commands it rather through affection. Thus in these animals as in ourselves may be observed from day to day the ability to develop or promote social relations on the basis of entirely different types of emotional attitude and expression. Where Malapulga would strike or bite, Sita would more likely caress or fondle. So temperamental differences are not necessarily sex-coupled and except on the basis of long and patient observation it is wholly rash to attribute even marked individual differences to species, sex, or age. Among other things, the particular experiences, fortunate or unfortunate, of the individual may be largely responsible for its temperamental traits or for their special manifestations. Conditions of development, status of health, the inroads of a disease, may be largely responsible for the exist-

ence or development of a particular trait of temperament or for aspects of docility.

Characterized also by temperamental differences which are illuminating, are the cage companions Jackito and Lu Lu. If Jackito were somewhat smaller the visitor might mistake him for Lu Lu's son. Certainly, she takes a motherly attitude toward him and attempts to command his respectful and affectionate attention. Jackito has the most spritely and mischievous expression of any chimpanzee in his community. Also he lives up to his looks! A better subject for portraiture could scarcely be asked. He seems to delight in having his picture taken. He actually poses and even changes expression to suit the convenience of the photographer. It is entirely unnecessary to command him to keep quiet, for he seems flattered by the opportunity to face the camera. This was so unexpected and peculiar that it especially commanded our attention.

Lu Lu, by comparison, is stupid, sluggish, and lacking in resources for self-entertainment or the amusement of others. Hers is a somewhat colorless disposition. When teased by Jackito, who frequently refuses to let her approach him, she often loses her temper and after pursuing him vainly for a time cries from disappointment or chagrin. At such times it is not Jackito's habit to come to her gently and comfort her, but, with

the thoughtlessness and lack of feeling of a mischievous boy, he is more likely to try to discover new ways of tormenting her.

Cage-mate of these two contrasted animals is Blanquita the melancholy. If Jackito's face is the brightest and most mischievous of the community, certainly Blanquita's is the saddest. One might infer from her habitual expression that she had lost her last friend. If she feels as badly as she looks, hers must be a miserable affective life. Any one who doubts the existence of extremely different characteristics in individual chimpanzees need spend only a few hours before the cage of these animals to be convinced that they are quite as highly individual and quite as different in their traits of temperament and character, in their liability to and expression of tough and tender emotions as are we.

One of the most impressive things about the emotional behavior of the great apes is their ability to distinguish clearly between injuries which are wantonly inflicted by man and those which are incidental to efforts on their behalf. Commonly, although not uniformly, the animals submit themselves readily to medical or surgical treatment when injured or ill. Frequently they do this even although made to suffer serious pain. Madam Abreu and others who have long been familiar with the ways of the great apes, testify not only

to their intelligent coöperation in such situations but to their persistent gratitude. Already instances have been cited of such coöperation by Madam Abreu's chimpanzees. On the other hand, it is definitely known that they long remember attack and injury. A person who has struck any one of the great apes without provocation or has perpetrated some practical joke which resulted in bodily injury, discomfort, or the annoyance of the animal, must look to his safety when within reach of the creature affronted. For insults no less than for kindnesses the memories of the animals seem long and their readiness to express their emotional attitude almost human.

There can be no doubt that a great deal of the resentment of persons toward lower animals, including monkeys and apes, is the result of misunderstanding or misinterpretation of their behavior. One mortally offends such an animal perhaps quite unintentionally, and when it retaliates one mistakes its behavior for wanton or vicious attack. This is commonly true in case of animal jealousy, but it applies also in bodily and affective injury. We habitually underestimate the degree of intelligence and the degree of emotional and social similarity to us of the chimpanzee, orang-utan, and gorilla.

A few days ago the newspapers reported that the little gorilla Sultan, owned by Miss Cunning-

ham, bit one of its attendants on the hand while being posed for a photograph. The evidence seems to indicate that he was greatly disturbed by the approach of strangers and held in memory a recent unpleasant photographic experience with a flash-light. What better could he do, then, than express his emotional condition by striking or biting the person who seemed to be immediately responsible for attempts at coercion?

It is only fair to the primates of the Abreu colony, in concluding this description of emotional life, to emphasize the dominance of tender emotions. Despite popular report and belief, playful and affectionate expressions are far more common in the daily life of these animals than are the emotions which give rise to aggressive or defensive response in fighting or other relatively destructive modes of action. The animals differ most of all from us in being perfectly natural, and in acting out, with little if any disguise, their feelings and ideas. We humans, by contrast, suppress, inhibit, disguise, and conceal emotions and thoughts. If a trained observer and thoroughly familiar with the great apes, one can fairly well infer their mental condition and attitude from their actions. But in the case of man it is far different. No wonder, then, that the monkeys and apes have been given a reputation which most persons consider bad! One might well contend

that it attaches equally to many persons and that only our unreasonable prejudice, based upon religious or other grounds, could have given origin to our prevalent opinions concerning the other primates.

Already it has been suggested that the discrepancies in descriptions of the behavior of these animals may in many cases be due to differences in age, sex, species, or experience. This certainly is true, and the contradictory or conflicting statements which are made by different authorities are doubtless due more frequently to difference in material of observation than to misobservation or careless description. Our gross ignorance of primate temperament, intelligence, and character can be dispelled by careful research. It is a fascinating opportunity for those who, while learning valuable things about our relatives, would gain fresh insight into human behavior.

Looking beyond the Abreu colony and the information which it has yielded, one discovers from an abundant literature on the monkeys and apes that their emotional life has commanded the attention of many observers. This raises the expectation that our knowledge is therefore reasonably complete and secure. Diligent reading shortly indicates, however, that it is superficial, inaccurate, and fragmentary. The writer hap-

pens to be fairly well acquainted with the great apes, as well as with the literature about them, and he feels safe in saying that the picture of the emotional life of these creatures drawn from Quinta Palatino is true to life and also entirely consistent with more detailed and technical descriptions to be found in scientific journals and books. The reader, nevertheless, may appreciate some confirmatory evidence.

Mrs. Ladygin-Kohts (4), who in her laboratory in Moscow for some years studied the mental life of a young chimpanzee, has given an excellent account of his emotional expressions. Her illustrations, several of which have been borrowed for these chapters, are the best available.

Referring especially to her little chimpanzee, Ioni, Mrs. Kohts writes:

The chief characteristics of the chimpanzee are his desire for locomotion, his need of play and of social intercourse. Fear is his constant companion. He is panic-stricken by anything which threatens his physical welfare and cowardly retires before an actual danger, but in case of forced competition he becomes violently and destructively angry. Struggle is especially fierce for the possession of property, for freedom, and in defense against attack. He has an inclination for affection but does not show overmuch desire for caresses. His egotism often borders on despotism and tyranny when he finds no opposition, as for example, with children who

are smaller and weaker than himself. In such cases his animal instincts are fully unleashed.

Of the positive qualities of the chimpanzee the first to be mentioned is his constant activity. Great curiosity is his chief impulse. He has fine power of observation and imitation, but embarrassment in experimenting results from lack of patience in overcoming difficulties, rapid fatigue, and strong inclination for new impressions.

It is the conviction of this authority—a conviction shared by Professor Wolfgang Koehler, who has made the most important of contributions to our knowledge of the mental life of the chimpanzee, and by the writer also—that in its emotional life this creature very closely resembles man. Individuality is quite as impressive as in other organisms, and those who know the great apes best use even the term personality.

One of Koehler's animals is thus interestingly characterized:

This little male, some three years old, is a most unusual animal, with chubby belly, beautiful face, symmetrical head, pointed chin, and protruding eyes which seem always to demand something. His life is spent in chronic revolt. When he has not enough to eat, when children dare to come near him, when someone near him dares to leave him, when to-day in an experiment he cannot succeed as he did yesterday, he does not complain;

he is indignant. He expresses his resentment by pounding both fists on the floor, hopping up and down and exhibiting marks of anger even to severe cramps in the glottis. He is a gifted egotist!¹

Such rough sketches of temperament, although fascinating, do scant justice to the individual. Nevertheless we recognize in them some of the characteristics which distinguish us humans and render individuality and personality valuable.

Whether laughter and weeping, joy and rage are essentially the same in ape and man is a technical, scientific problem, or even an assemblage of problems. Doubtless the facts might be stated simply and intelligibly if we knew them definitely; but as the matter stands we have certain important general information and impressions which constitute a start toward knowledge of emotional life in the primates. There can be no doubt that as research goes forward it will help us better to understand ourselves as well as the chimpanzee and its humbler relatives.

¹ This is a free translation of the original German.

CHAPTER 9

ANTHROPOID SPEECH AND ITS SIGNIFICANCE

THERE is no lack of communication in the Abreu primate colony. On their part, owner and keepers talk much to, and little with, the monkeys and apes; and the animals in their various ways transfer their states of mind to one another. Time would enable the patient, trained, and skilled observer to discover the essentials of primate language at Quinta Palatino. But neither Madam Abreu nor the writer has well begun the task, much less completed it; therefore, this chapter is to be based upon the work of several observers. It is rather a summary of what is now known on the subject than a transcript from Cuban experience.

Vocalization, speech, language are terms whose meaning we should agree upon at the outset. All of the primates have a rather elaborate vocal mechanism with which they can produce varied sounds. In the apes the vocal organs are similar to the human, and they are capable of producing sounds varying widely in pitch, quality, and volume. The gorilla is notorious for the volume of

its voice, the gibbon and chimpanzee for the carrying and penetrating character of some of their vocalizations.

Vocal sounds, however, are not necessarily speech. They may be simple and monotonous cries significant of emotional crises. Only when they constitute definite and somewhat complex systems of special sounds having ideational or emotional value, do we ordinarily call them speech. To speak, then, is to vocalize with intent to express meanings, feelings, or both. Vocalization is inclusive of speech. It ranges from simple chirps or clicks to the indefinitely extensible imitative chatter of the parrot and human conversation. Although most animals have voices which are used more or less frequently and effectively in emotional expression, few speak in the sense which we have given the term.

Language, in turn, is inclusive of speech, for there are indeed many kinds, some of which do not require vocalization. Any system of symbols used to express ideas or feelings may serve as a language. Familiar examples are the finger and hand positions and movements formerly used extensively by deaf-mutes; pictographs used by various primitive peoples; hieroglyphics, and the various systems of writing which make use of modern alphabets. The signs, then, may be attitudes or movements of the person who is trying

to express himself or they may be environmental objects or agencies. Ingenious children commonly invent languages for their own amusement and use. In so doing they may employ gestures, written signs, objects natural or artificial, mechanically produced signs, or their own vocalizations.

Man evidently has a special gift for the invention and development of language as a means of communication. His mental growth and his material and social progress are conditioned to a marked degree by this almost unique gift. No other living animal approaches him in this respect, but it would be rash indeed to assert that no creature other than man has developed a language. Ants, in some ways the most highly developed among animals, certainly have a system of sensory signs, probably in the main odors and contacts, which serves them much as sights and sounds serve us in establishing social contacts and in communicating significant information. Although there is no indication that they talk, there is very convincing evidence that they are able to communicate. The study of ant language is peculiarly alluring, and, in view of the interest which it has commanded, it seems strange that we do not know more about it.

But this is not a general discussion of animal communication. The question which we set out to answer is: Does any primate, other than man,

talk? It would be difficult to find a primate which does not use its voice to obvious advantage in making itself understood. We must therefore inquire how much it expresses and whether or not ideas as well as feelings are definitely indicated by sounds. To consider other than casually the vocalization or the speech of monkeys would take us far afield. Instead we shall concentrate on what has been learned about the vocal expressions of anthropoid apes and their significance.

Garner (16), a widely known student of primate speech who devoted the better part of his life to noting, recording, analyzing, and imitating the vocalizations of monkeys and apes, offers in his books much excellent evidence of the existence of vocal language or speech in the monkeys as well as in the great apes. For several types he describes sounds which seem to stand as words. In a given individual or species they may number from ten to a score. So definite are these vocalizations and their meaning that Garner was able to communicate with the animals. Hence, he contends that monkeys and apes speak, and states that their vocal language differs from ours in complexity and degree of development but not in its purpose or use.

As Garner was not adequately trained for his difficult research and failed to command the scientific resources of his time, his results have not

been accepted generally by scientific authorities. It is nevertheless true that many of his observations have been substantially verified, while some have been proved incorrect. Probably his enthusiasm led him to exaggerate the degree of intelligence, and the power of vocal communication, of his subjects. But the writer humbly confesses that the more he learns about the great apes and the lesser primates by direct observation as contrasted with reading, the more facts and valuable suggestions he discovers in Garner's writings.

For several years, in their native habitat and also in France, Dr. Louis Boutan (7) studied the intellectual and affective behavior of gibbons, and also their vocal expressions. Unlike Garner, he comes to the conclusion that the speech of animals is quite different from our own, and instead of being a true language is, as he terms it, a pseudo-language.

In man there is a primary language of emotions which during infancy and early childhood serves to express the feelings. This early rudimentary language is directed by sense impressions, images, and affective experiences. In several important respects it is like the speech of monkeys and apes. Later the child learns to express vocally ideas as well as feelings, and gradually there develops ability to communicate with one's fellows over a wide range of experience. Such is true speech in

man. In pseudo-language, as Boutan thinks of it, the sounds or other indicative signs are spontaneous and innate or instinctive. By contrast, the sounds or signs which constitute the elements of a true language—such, for example, as human speech—are acquired or learned. This is possible because of the social tradition which carries from generation to generation certain conventional sounds or other signs to which definite meaning is ascribed.

Boutan, then, would say that human speech is acquired by the individual through imitation and tuition. Of course he would also admit that the individual has the power of inventing new forms of language. Whether or not he is right in his conviction that man alone possesses a true as compared with an instinctive vocal language, it remains for further research to decide. The writer suspects that the distinction is by no means so simple and clear-cut as Boutan makes out, and that both inheritance and individual acquisition contribute to languages, whatever their medium and their degree of development.

The gibbon, according to Boutan, has the best singing voice of any anthropoid ape. Its calls are sometimes agreeable, but they are often too shrill and penetrating for comfort. For the individual which he most carefully studied, four groups of sounds are described. The first are

those which seem to express a state of satisfaction or well-being; the second similarly express a state of discomfort or fear; the third group seems to be intermediate in value between the first and second, and the fourth indicates states of excitement. In each of these four categories there appear several sounds which one might naturally think of as words.

Although Boutan's gibbon, in the course of his investigation, adapted very satisfactorily to conditions of life in captivity and acquired many new and useful habits, no new sounds or words were learned. Such ability to express herself vocally as she had, seems to have been instinctive. Naturally enough—indeed, inevitably—he concludes that there is a world of difference between gibbon speech and human speech.

As there is no other record of investigation to which we may appeal for further light on the speech of the gibbon, we must believe, provisionally at any rate, that it expresses feelings vocally, but not ideas, and lacks ability to learn to talk.

Although the orang-utan has a good enough voice, it is known as a silent creature whose common vocalizations are whines, screams, and groans of complaint, fear, anger, or satisfaction. No such satisfactory study of the vocal expressions of the orang-utan, as has been made by Boutan with the gibbon, is known to the

writer. Consequently nothing further can be said.

Perhaps because it is more given to sociability than the other apes, and certainly also because of its delightful disposition, the vocal expressions of the chimpanzee have commanded the attention of scientists. It always seems as though this creature had something to say, and every now and then he makes one feel that he actually is saying it.

First, in order of time, Garner records of the chimpanzee that its speech consists of not more than twenty-five or thirty words, many of which seem to be "vague or ambiguous." Yet in summing up the results of his study he remarks:

In conclusion I again assert that the sounds uttered by these apes have the characteristics of human speech. The speaker is conscious of the meaning of the sound used. The pitch and volume of the voice are regulated to suit the condition under which it is used. The ape knows the value of sound as a medium of conveying thought. These and many other facts show that their sounds are truly speech [Garney (16), p. 116].

Not one of these statements can be accepted by the psychologist without further evidence. They may be correct, but the chances are that further research will indicate their inadequacy.

The chimpanzee shows a rudimentary gesture language. "No" is expressed by a movement of

the head, as in us; similarly, definite positions and movements of the arm and hand indicate affirmation.

The vocal expressions of two young chimpanzees have been carefully observed by Mrs. William S. Learned (9) and faithfully transcribed. Her results show a total of thirty-two sounds made by one or other of the animals, which she lists as words or elements of speech. These vocalizations she found were associated mostly with situations which have to do with food or drink and with other animals or persons. As a rule the sounds seem to be part of an emotional expression, and from Mrs. Learned's descriptions it would seem that there may be as many significant "words" as there are varieties of emotion. Whether or not a chimpanzee "word" ever stands for a definite idea, Mrs. Learned does not inform us. Her descriptions of the vocal expressions of these little creatures are particularly important and interesting because she has skillfully combined verbal picture of the situation with musical description of the vocalization. Panzee, the little female subject, is characterized as a sweet singer because of the quality and use of her voice. Chim, the little male, although also an expert vocalist, expressed himself less pleasingly.

There is no obvious reason why the chimpanzee

and the other great apes should not talk, but it seems to be the consensus of opinion among expert observers, as well as those who know the animals only casually, that they do not do so. As the writer has studied the ideational behavior of these animals, he has persistently wondered why they have not developed speech and whether they may not be taught to talk. It would seem that one of the best ways to test their ability would be the attempt to teach them to speak, for if they cannot learn to express themselves by a system of vocables they probably have no true spoken language. One might very well anticipate success in such an experiment, for it is perfectly obvious that the animals learn to understand much that is said to them and have a handy vocal mechanism. Many years ago George J. Romanes (17), a distinguished English naturalist, wrote thus of a chimpanzee in the London Zoological Gardens:

This ape has learned from her keeper the meaning of so many words and phrases, that in this respect she resembles a child shortly before it begins to talk. Moreover, it is not only particular words and particular phrases which she has thus learned to understand; but she also understands, to a large extent, the combination of these words and phrases in sentences, so that the keeper is able to explain to the animal what it is he requests her to do [(17), p. 126].

Convinced of the existence of chimpanzee ideas and suspecting that they might under favorable conditions gain expression through language, I recently tried to teach the two young chimpanzees, Chim and Panzee, to utter words. Several methods were used to induce them to respond in this way, but none succeeded. My purpose was to give the animals incentive for imitating sounds which I was certain they could reproduce. I did not actually put them through the process of making the sound, as for example, by holding the lips, tongue, or nose in proper position. Instead, I depended entirely on the imitative tendency, hoping that they might get the idea that by making a certain sound they would win a desired reward. Although the experiments, in different forms, were carried on for several months, they merely fatigued the animals, and a stage was finally reached when it was difficult to command attention. Although I admit surprise in this outcome of my effort at training the animals to speak, I am not yet convinced of their inability. This is partly because of the measure of success achieved by other investigators, but even more because of my suspicion that my methods were in various ways unsatisfactory.

Garner writes that he taught a little chimpanzee, whom he called Moses, to utter a few words. He selected the following: "mama"; the French

word *feu*, fire; the German word *wie*, how; and the native Nkami word *nkgwe*, mother. He writes:

Every day I took him on my lap and tried to induce him to say one or more of these words. For a long time he made no effort to learn them; but after some weeks of persistent labor and a bribe of corned beef, he began to see dimly what I wanted him to do. . . . In his attempt to say "mama" he worked his lips without making any sound, although he really tried to do so. . . . With *feu* he succeeded fairly well, except that the consonant element, as he uttered it, resembled "v" more than "f." . . . In his efforts to pronounce *wie* he always gave the vowel element like German "u" with the umlaut, but the "w" element was more like the English than the German sound of that letter.

Taking into consideration the fact that he was only a little more than a year old, and was in training less than three months, his progress was all that could have been desired, and vastly more than had been hoped for [(16) pp. 136, 137].

My animals were older than Garner's Moses, but I have no reason to suppose that they were less intelligent or less capable of learning words. Perhaps it is merely a matter of long continuance of training, patience, persistence, and determination on the part of the teacher.

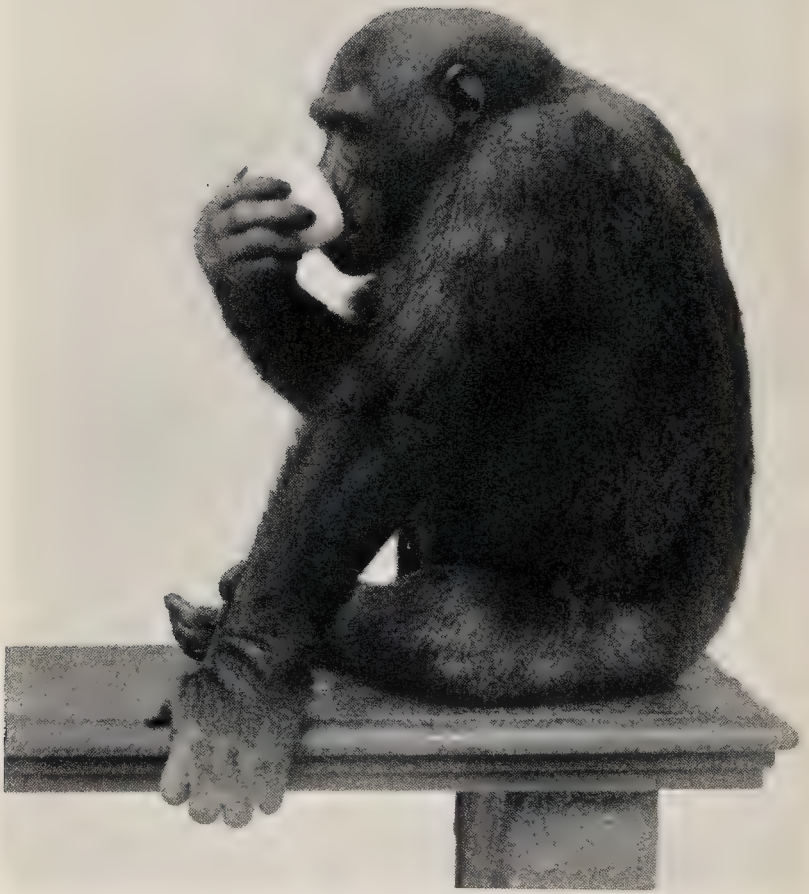
My humiliation is still further accentuated by the success of Dr. William H. Furness (18) in



Courtesy of Mr. Lee Russell

THE CHIMPANZEE WHO DID NOT LEARN TO TALK

Prince Chim with one of his best friends



Courtesy of Miss Alyse Cunningham

THE YOUTHFUL GORILLA, SULTAN

teaching a young orang-utan to say two or three words. I cannot do justice to his interesting description except by quoting:

In the case of the orang-utan it took at least six months of daily training to teach her to say "Papa." This word was selected not only because it is a very primitive sound, but also because it combined two elements of vocalization to which orang-utans and chimpanzees are, as I have said, unaccustomed, namely: the use of lips and an expired vowel sound. The training consisted of a repetition of the sounds for minutes at a time, while the ape's lips were brought together and opened in imitation of the movements of my lips. I also went through these same manœuvres facing a mirror with her face close to mine that she might see what her lips were to do as well as feel the movement of them. At the end of about six months, one day of her own accord, out of lesson time, she said, "Papa," quite distinctly and repeated it on command. Of course, I praised her and petted her enthusiastically; she never forgot it after that and finally recognized it as my name. When asked, "Where is Papa?" she would at once point to me or pat me on the shoulder. One warm summer's day I carried her in my arms into a swimming pool; she was alarmed at first but when the water came up to her legs she was panic-stricken; she clung with her arms about my neck, kissed me again and again and kept saying, "Papa! Papa! Papa!" Of course, I went no further after that pathetic appeal.

The next word I attempted to teach her to say was

“cup.” (Let me say that by this time she understood almost everything that it was necessary for me to say such as “Open your mouth,” “Stick out your tongue,” “Do this,” etc., and she was perfectly gentle and occasionally seemed quite interested.) The first move in teaching her to say “cup” was to push her tongue back in her throat as if she were to make the sound “ka.” This was done by means of a bone spatula with which I pressed lightly on the center of her tongue. When I saw that she had taken a full breath I placed my finger over her nose to make her try to breathe through her mouth. The spatula was then quickly withdrawn and inevitably she made the sound “ka.” All the while facing her I held my mouth open with my tongue in the same position as hers so that her observation, curiosity, and powers of imitation might aid her, and I said *ka* with her emphatically as I released her tongue. After several lessons of, perhaps, fifteen minutes of this sort of training each day she would draw back her tongue to the position even before the spatula had touched it, but she would not say *ka* unless I placed my finger over her nose. The next advance was that she herself placed my finger over her nose and then said *ka* without any use of the spatula; then she found that in default of my finger her own would answer the purpose and I could get her to make this sound any time I asked her to. It was comparatively very easy from this to teach her to say “kap” by means of closing her lips with my fingers the instant she said *ka*. At the same time I showed her the cup that she drank out of and I repeated the word several times as I touched it to her

lips. After a few lessons when I showed her the cup and asked "What is this?" she would say cup very plainly. Once when ill at night she leaned out of her hammock and said "cup, cup, cup," which I naturally understood to mean that she was thirsty and which proved to be the case. I think this showed fairly conclusively that there was a glimmering idea of the connection of the word with the object and with her desire.

Despite his notable success in training the orang-utan and his observation that both chimpanzees and orang-utans may be able to understand much that is said to them, Dr. Furness says that "if these animals have a language it is restricted to a very few sounds of a general emotional significance. Articulate speech they have none and communication with one another is accomplished by vocal sounds to no greater extent than it is by dogs, with a growl, a whine, or a bark."

There are many interesting and valuable descriptions of the emotional vocalizations of the great apes, but the essentials of what is known about their speech are indicated by the observations which have been described. It remains merely to formulate our tentative conclusion about the subject and to answer the question: Do the apes speak?

Everything seems to indicate that their vocal-

izations do not constitute true language, in the sense in which Boutan uses the term. Apparently the sounds are primarily innate emotional expressions. This is surprising in view of the evidence that they have ideas, and may on occasion act with insight. We may not safely assume that they have nothing but feelings to express, or even that their word-like sounds always lack ideational meaning. Perhaps the chief reason for the ape's failure to develop speech is the absence of a tendency to imitate sounds. Seeing strongly stimulates to imitation; but hearing seems to have no such effect. I am inclined to conclude from the various evidences that the great apes have plenty to talk about, but no gift for the use of sounds to represent individual, as contrasted with racial, feelings or ideas. Perhaps they can be taught to use their fingers, somewhat as does the deaf and dumb person, and thus helped to acquire a simple, nonvocal, "sign language."

CHAPTER 10

FROM GENERATION TO GENERATION

WHEN in January, 1924, I first visited Quinta Palatino by invitation of Madam Abreu, and discussed her interesting collection, observations, plans, and hopes, she showed me with evident pleasure a letter from Dr. Metchnikoff which, rendered into English, is here presented.

INSTITUT PASTEUR
25, Rue Dutot

Paris,
August 29, 1915

DEAR MADAM:

I am infinitely obliged to you for your interesting letter accompanied by the splendid photographs, which I have just received. It is indeed marvelous that you have been able to obtain them, for, to my knowledge, it is the first time that attempts to photograph an anthropoid ape in captivity have been successful. All the advice that I have had from doctors in Africa—in Guinea, and in the Congo—is to the effect that they have never been able to obtain a likeness of a chimpanzee. I congratulate you then on your result, which presents something of great importance for the future in the study of

the infectious diseases such as scarlet fever, measles, diphtheria, etc.

All that you say about the relations between the male and the female, about gestation, about the birth and rearing of the young, is of vital interest. Since you are continuing your observations perhaps it will be possible for you to tell me still more details of the life of your chimpanzees. What is the procedure by which the male arrives at intercourse with the female? How does he behave in taking his particular position, and does she manifest any coquetry? Does she give him her love at once or does she first offer some resistance? Does copulation continue during pregnancy or does the female cease to accept the male? Does the latter caress the female before and after the act?

How many interesting observations you will be able to make on the education of the little one. Does the mother take care of the infant and does she give him some cuffs? How does the male behave face to face with his offspring? Does he continue to live maritally with his mate, and does he not make advances to the dry nurse? (The question as to whether the anthropoids are monogamists or polygamists is particularly interesting.)

You thought, Madam, that your letter would appear to me too long. I have read and re-read it, many times, but I find it all too short, so vital is the subject of your observations.

In thanking you again I pray you Madam, to accept the expression of my respectful homage.

ELIE METCHNIKOFF.

The appreciative interest which this eminent medical authority showed in Madam Abreu's work naturally gave her great encouragement and incentive to further effort. It is significant indeed that this letter, written ten years ago, should have been accompanied by serious consideration on the part of the Pasteur Institute to establish a special station and laboratory for the study of monkeys and apes and their utilization in the investigation of medical problems. As will presently be related, decision in this matter was favorable, and now after years of delay because of the World War a station has actually been established in French West Africa (French Guinea), and work is in progress. It may reasonably be surmised that Madam Abreu's achievements and her communications with Dr. Metchnikoff had no inconsiderable part in stirring the interest of the authorities of the Pasteur Institute and in leading them to their decision.

Information about any aspect of the life of the monkey or ape is fragmentary and relatively unreliable, yet with reference to the life history of the animals, as suggested by the title "From Generation to Generation," it is peculiarly so. The happenings at Quinto Palatino during the last decade or so have added substantially and valuably to our fund of knowledge, but thus far

this knowledge has been possessed solely by Madam Abreu and her associates. It is now proposed to assemble it in an orderly way and to present it in supplementation of other records, and as indicative of persisting gaps in our knowledge which must be filled by scientific effort.

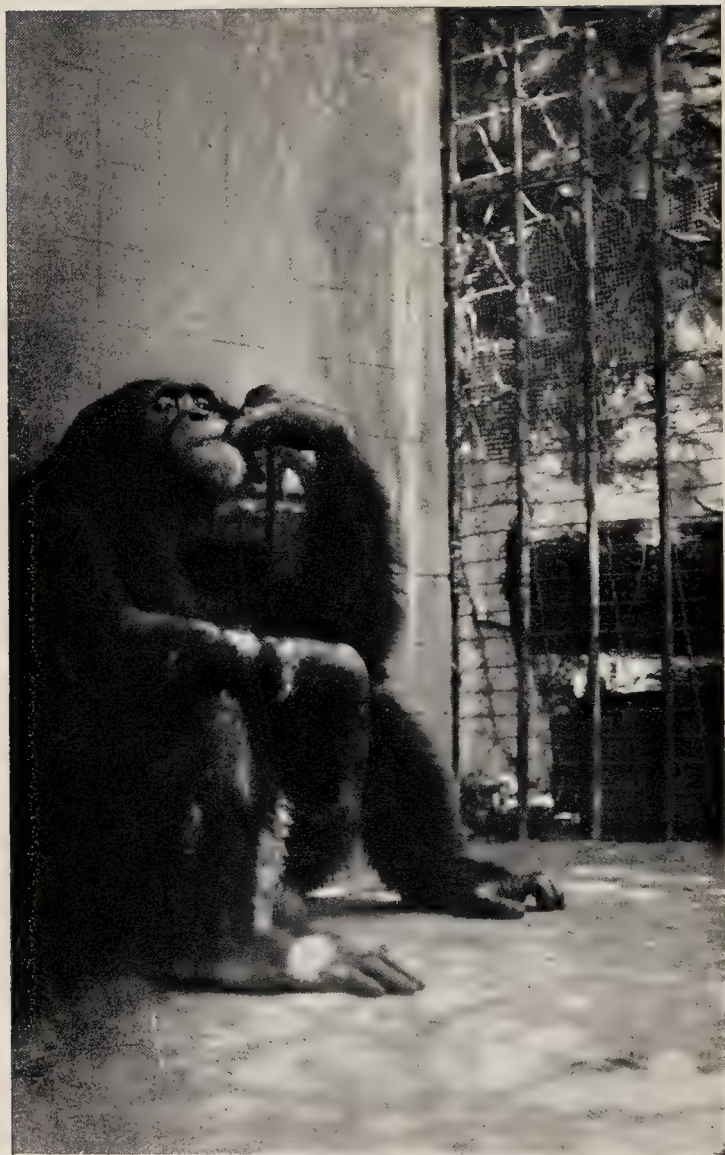
There are happy primate families in Madam Abreu's beautiful park to-day, but among them none half so interesting to the lay observer as the chimpanzee trio, Jimmy, Monona, and Lita—father, mother, and infant daughter.

But instead of plunging directly into the life history of Jimmy and the members of his family, we should first review Madam Abreu's earlier attempts to breed chimpanzees in Cuba. It will be recalled that her first chimpanzee pet was the remarkably intelligent male Chimpita. She tried to mate him with the female Cucusa, but, as related by Dr. Louis Montané (19), the eminent anthropologist, at the time resident in Havana, Chimpita "because of certain intimate abnormalities of his physical constitution had no succession." He died in 1914 and was replaced in the affections of Cucusa by the surviving male, Jimmy. The first product of the relations of Jimmy and Cucusa was Anumá, whose birth on April 27, 1915, rendered that date memorable in the calendar of Quinta Palatino and, indeed, of



CUCUSA AND ANUMÁ

This photograph was taken for Madam Abreu shortly after the birth of the Cuban chimpanzee, Anumá, in 1915



ANUMÁ TO-DAY, AGED TEN YEARS

His delightfully characteristic attitude and his peculiar expression are sufficient excuses for the use of this imperfect negative

Cuba. According to Madam Abreu's account of the situation, Cucusa refused to accept Chimpita as a mate because they were of different species. "But when Jimmy came from London she accepted him. Previously she had been with Chimpita for about six months, but nothing had happened."

After the birth of Anumá the adolescent female Mimosa was with Cucusa and she eagerly constituted herself the nursemaid, often taking entire charge of the baby. Later, when Mimosa was mature, she was left with the male Jimmy, but he paid no attention to her although they were on the best of terms and, except for difference in species and country of origin, there was no apparent reason why they should not breed. Madam Abreu cites this relation of the two animals as another indication of the relative fidelity and monogamous tendency of the chimpanzee and also of the efficacy of species barriers.

Jimmy and Monona accepted one another as natural mates, although it is related of the little female that she first rejected the advances of the male and it was several months before they bred.

Madam Abreu's observations in connection with the sex and family relations of Chimpita and Cucusa, Jimmy and Cucusa, Jimmy and Mimosa, Jimmy and Monona, and Anumá and Malapulga, convince her that there are marked sex prefer-

ences in which similarity, or as she puts it, "being from the same country and of similar type," plays a conspicuous rôle. In referring to the matter she emphatically expresses herself by saying:

"Different species of animals and animals from different countries almost never breed. There are exceptions. One case I recollect of monkeys of different kinds which married, but the mother and baby both died. Also it is notable that the males and females differing as to country of origin, species, or both, are less interested in one another than are those which are similar."

As an example of this she cites the relations of her three orang-utans. The full-grown Cachesita lives with two adolescent females, the one very similar to him in appearance, the other somewhat different. He is devoted to the former and shows little interest in the latter. Whether or not Madam Abreu has hit upon the actual ground of his partiality, we do not know, but of the preference there can be no doubt.

Experience suggests the extreme desirability of bringing together slowly animals which are to be mated. This refers alike to the monkeys and the great apes, but more especially to the latter because of the greater risk of serious injury. Madam Abreu advises those who are mating an-

imals first to place the male and female in separated adjoining cages so that they may become thoroughly acquainted without opportunity to injure each other. Subsequently, at the proper time, they may be placed together without unusual risk even in a restricted cage environment. It is of course important to consider in such case the significance of the restricted movements of the animals. Whereas in the wild there is excellent opportunity for self-protection, the cage limitations give an unfair advantage to the stronger animal which, on occasion, may prove disastrous.

The courtship behavior of the great apes has been observed at Quinta Palatino both when the animals are in adjoining cages and when they are together. The male chimpanzee is frequently seen to caress the female, and Madam Abreu has even seen a straw used by the male to stroke the female through the barrier of netting between them. Kissing among these animals is, like many other acts, almost human in its essentials. Possibly this is imitative. At any rate, the writer has seen no descriptions of the behavior in animals of the wild uncontaminated by human association. The sex or mating dance of the male chimpanzee has been witnessed repeatedly at Quinta Palatino. It is known that the creatures possess a sense of rhythm and a fondness

for dancing. In case of the sex dance of the male the sense of rhythm is exercised and the animal also attracts attention by beating the ground with its foot and thus in a sense preparing the way for its approach. We greatly hoped to obtain pictures of the sex dance of Jimmy, but his fear of the camera frustrated every attempt.

Madam Abreu has had three opportunities to observe the fruitful mating of chimpanzees, behavior during the period of gestation, and the birth and early days of the young. The first of these opportunities appeared in the relations of Jimmy and Cucusa and the resulting baby Anumá; the second in the relations of Jimmy with Cucusa and the birth in France during the war of an unnamed infant which survived for only a few weeks; and the third, the relations of Jimmy and Monona with the resulting offspring, Lita.

For the first of these series of events we have the record of professional scientific observers to supplement that of Madam Abreu. Dr. Louis Montané read before the Cuban Society of Natural History, in 1915, a paper on "A Cuban Chimpanzee" (19) in which he describes the birth and early days of Anumá. Relative to the pregnancy of Cucusa and the period of gestation, Montané says, "Pregnancy was first suspected in

August, 1914, because of the appearance and behavior of the female. Finally, nine months after the first visible symptoms Anumá was born." This event established the duration of gestation in the chimpanzee. Madam Abreu confirms Montané's statements and asserts that they are confirmed also by her later observations in connection with the development of the baby born in France and Lita. It seems reasonably certain, then, that in the case of the chimpanzee the period of prenatal development is virtually the same as in man.

During this period the relations of the male and female continue as usual, but following the birth of the young and until the baby is weaned and the production of milk ceases, there is no relation whatever between the animals. It appears, then—and this is Madam Abreu's conclusion—that the condition of lactation determines the relations of the sexes. Montané, referring to this matter, states that in Cucusa lactation began on the second day after the birth of Anumá and that "sixteen days after birth there was a normal return of catamenia but without external genital turgency." Seemingly in flat contradiction of this, Madam Abreu maintains that catamenia does not reappear for several months; indeed, is not resumed until the infant has been weaned. In the

case of Anumá this occurred after about eighteen months; in that of Lita after about twenty months.

For its bearing on this conflict of statements, the writer may say that during his stay in Havana in the summer of 1924, when Jimmy, Monona, and Lita were caged together, Monona at no time gave evidence of catamenia or of sex interest or relations with Jimmy. Lita, although not entirely dependent on her mother for nourishment, was still treated by Monona as though nursing. The evidence, then, seems entirely to substantiate the common statement that the female chimpanzee nurses its baby for several months, even perhaps for a year or two, and that for several years the young animal continues with its parents, constituting a partially dependent member of the growing family group.

The actual birth of the infant was not observed in case of any of Madam Abreu's animals, but the action of Monona following the birth of Lita has already been described as an example either of remarkably intelligent behavior or of naturally adapted action such as is seldom if ever found in the human species. Everything indicates that the behavior of both male and female at such times is as appropriate as that of persons, and no less indicative of altruistic motive and devotion to the offspring. Instances are lacking of

ill treatment by the male of either mother or infant.

The young chimpanzee, having been thoroughly cleaned and dried by the mother, clings to her hair, and presently, under normal and favorable circumstances, begins to nurse. Cases are on record of infants born to captive animals which failed to nurse and finally died of starvation. In all probability this is caused by an abnormal condition of the female resulting in failure to produce milk or other peculiarity inimical to the welfare of the young. The care of the infant chimpanzee by its mother during the early days and weeks is worthy of a high level of intelligence. There is a notable combination of firmness, tenderness, skill, and care. The mother may be impatient, but except under abnormal conditions she seemingly is not vindictive or neglectful. When she punishes, it is for adequate cause, and one may approve her implicit confidence in this pedagogical method even though he doubts its efficacy in his own species!

Then comes the period of tuition. "Three times," says Madam Abreu, "I have seen a mother chimpanzee take her baby by the arms and try to show it how to walk. The mother begins to do this when the infant is about two months old." But previously, of course, the infant has been taught many things and trained in a variety

of ways by parental example and tuition. The lesson in walking is cited merely to indicate that the little one is actually put through its paces, as well as shown how to act. Speaking of the relations of chimpanzee children to parents, Madam Abreu remarks, "They are much more obedient than the best of human children." Perhaps she is right and perhaps this is due to sounder principles of tuition and a more rational, if not rationalized, pedagogy than that which we to-day support. Actually the chimpanzee does not learn to walk for several months. The time perhaps varies widely as in the case of children, but the ability is acquired much earlier, ordinarily before the sixth month in the chimpanzee, whereas the child usually requires at least a year.

The milk teeth begin to appear in the first or second month and before the end of the first year all have been acquired. It is Madam Abreu's belief, based on repeated observation, that the chimpanzee usually begins to lose its milk teeth in the fifth or sixth year, and that these are replaced by permanent teeth by the age of seven or eight. The change, she says, is very rapid, occupying only a few weeks or at most a few months.

The tranquillity of a monkey or ape family in captivity is not uninterrupted. Instances of disturbance of the peace of the family by the male and father have been cited for the baboon and the

chimpanzee. During the early period of infancy, the male parent may behave very well indeed, may appear devoted to his offspring and actually prove helpful in the care of it, although undoubtedly his main responsibility is to provide protection for mother and child. But as the baby acquires greater freedom and independence, the father also becomes more independent and more eager, apparently, for freedom from the limitations set upon him and his mate by the responsibility for offspring. Then it happens that the male may act as though trying to drive the infant from the household. This was very clearly the tactic of the old male baboon who, if not as reward, at least as sequel to his persecution of his infant son, lost an eye at the hands of his mate.

Jimmy, morose old chimpanzee as he is, has not been observed to treat Lita unkindly. Now and again, as previously stated, he has outbursts of temper, provoked perhaps by jealousy, during which he yells in a terrifying way, rushes about the cage, seizes anything within reach, and shakes it as if to tear everything to pieces. He may even rush toward Monona and the baby, as though bent on injuring or frightening them, but nothing comes of the row except that the keepers on hearing the outcry immediately hasten to the cage and isolate the big male so that he may not in his frenzy accidentally injure either baby or

mate. That Monona and Lita are afraid of Jimmy during these periods of excitement there can be no doubt, for the baby promptly runs to her mother and takes refuge on her back to which she clings tenaciously with hands and feet firmly grasping the hairy coat. Monona, on her part, takes refuge either on a raised platform under the roof of the cage or in a remote corner, getting as far as possible from Jimmy and in a sheltered position. This is discreetly precautionary, for within the narrow limits of the cage the male might do serious injury to his young if the mother did not keep it out of the way.

Apropos of these periodical outbursts of Jimmy, his owner says that the adult male chimpanzee, however good his temper and disposition, cannot be trusted since he is subject to "crazy spells" during which he may act most unnaturally and roughly. She always objects to having any one except herself or her keepers go into the cage with Anumá or any other well-grown ape because, as she puts it, one never can tell when the animal may be seized by such a spell and either bite or rend one. Undoubtedly hers is a wise precaution.

Anumá's life has been observed from conception through birth, infancy, childhood, and adolescence, to the threshold of maturity. He now is more than ten years old and is comparable

physically, we believe, with a boy of twelve to fourteen. There is no positive proof that he is sexually mature, but his behavior and what has been learned of other individuals suggest that the male chimpanzee attains sexual maturity at the age of ten to twelve years. The female of the species seemingly passes from adolescence into sexual maturity a year or two earlier, perhaps at the age of eight to ten years. Malapulga and Sita, for example,—individuals which seem to be about half-grown, weighing about fifty pounds, and aged seven to eight years as nearly as may be judged by size, weight, and condition of teeth,—are quite clearly on the threshold of sexual maturity. Malapulga is somewhat in advance, and if the two were in the wilds she almost certainly would mate earlier than Sita.

It is difficult at best to estimate the age of a primate. Madam Abreu maintains that the condition of the teeth is the best single criterion, and she habitually judges the age of her animals by their teeth precisely as does an experienced judge of horses. The presence in the chimpanzee of the full set of milk teeth indicates an age of six months to approximately five years. The presence of the permanent teeth similarly indicates an age of five years or more. The condition and amount of wear of the permanent teeth indicate ages beyond ten years with degree of accuracy

and reliability dependent upon the experience of the observer.

The birth date of captive chimpanzees seldom is known and the guesses commonly made at the age of these animals are anything but reliable. Usually those who deal in monkeys and apes assign an age to suit the purchaser. Thus the young chimpanzee may be characterized as one year of age, if a baby is desired, or as three or four years of age if a more mature individual is in demand. Lita, seemingly a remarkably healthy, well-nourished, and altogether normal individual, at the age of two years weighs, it is estimated, not more than twelve pounds; yet the writer has seen chimpanzees weighing twenty to thirty pounds which were soberly and seriously described as about two years old.

The animals at Quinta Palatino and the observations of Madam Abreu clearly indicate that the chimpanzee grows slowly during the first four or five years of life, and very rapidly for one, two, or three years during the adolescent period of, say, five to ten years of age. In this it closely resembles man. Most of the chimpanzees which are imported into America from Africa are more than two years of age. The majority probably range from three to five years. The reasons for this are not difficult to imagine. Animals captured during the first year of life are difficult to

rear successfully. They require nursing or its equivalent in nutritional care. The majority doubtless die in Africa. Those captured during the second year of life stand a much better chance of survival, but are more than liable to succumb to the hardships of transportation over land and water for thousands of miles. So it naturally and almost inevitably comes about that the animals which appear in the markets of the United States and are found in our zoölogical gardens, shows, and private collections are at least three years of age, and in the great majority of cases even older.

How long the chimpanzee, or any other monkey or ape may live, no one really knows; nor, indeed is it known how long the sexual life of the animal persists, or when it enters upon physical decline, becomes senile, aged, decrepit. Exact information in these matters is wholly lacking, but the shrewdest estimates, based upon such evidence as has already been mentioned, are that the duration of the chimpanzee's life may equal that of man. It is surmised, however, that the average duration of life is very much shorter than man's because of the relatively unprotected existence; for whereas in his declining years man is, or may be, assiduously cared for, the chimpanzee is left more largely to its own devices and naturally suffers the hardships of an existence which

provides neither ordinary comforts nor luxuries, neither medical attention nor the affectionate ministrations of relatives.

Jimmy, we have said, is thought to be between twenty and twenty-five years of age. Animals have been captured whose ages were estimated as high as fifty years. In this period of life—that, perhaps, of post-maturity—many gray hairs appear among the black, and the coat on the animal's back may be whitish. The condition of the bones is also indicative of long life. Dr. Calmette of the Pasteur Institute has commented on an extraordinarily large male chimpanzee recently captured in Africa, whose age was supposed to be at least twenty-eight years; also on a captive female chimpanzee aged presumably about fifty years.

Putting all the facts together, it seems probable that the chimpanzee generation is not very different in its temporal span from that of man; possibly five years shorter because of the difference in environment and social relations. The period of gestation is pretty certainly nine months; the period of infantile development approximately a year, for by that time the individual is able to run about and partially support itself in independence of the mother and nurse; the period of childhood—beginning, perhaps, in the second year, and characterized by extreme activity, play-

fulness, mischief, and irresponsibility—runs at least into the fifth year. Then begins a period of adolescence which extends perhaps to the seventh or eighth year in the female, and the ninth or tenth year in the male, and is comparable with the human span of life of six to twelve in the girl, and eight to fourteen in the boy. Facts are too meager to justify comparison of the span of maturity in chimpanzee and man, but there is a high degree of probability that if individuals of the two species were kept under equally favorable conditions, they would live to a similar ripe old age. It is even possible that the less highly endowed animal, because of relative freedom from worry and vivid imaginings of death or hell-fire, might outlive man!

Despite the varied primate materials at Quinta Palatino, this has been preëminently a chimpanzee chapter. It is well established that the more primitive types of primate, including all the monkeys, and the gibbon among the anthropoid apes, mature much more rapidly than do the great apes, breed therefore at an earlier date, and yield to the wear and tear of existence after a relatively short span. Even the period of gestation is much shorter than in chimpanzee and man. Evidences bearing on the duration of prenatal development, infancy, maturity, and life itself are not lacking, but they are so scattered and difficult to evaluate

that we have decided to content ourselves in this chapter with the observations which have been made at Quinta Palatino under uniquely favorable circumstances. There, at least, one may learn with assurance the date of birth of a particular individual and may measure its physical characters and its behavior against a definite period of development and experience. Never can the study of monkeys and apes be carried forward with wholly satisfactory results until the life history of the individuals under observation is intimately and accurately known. It is absolutely essential to begin with the date of birth. It is desirable, as in the case of Anumá, to be able to begin with the mating of the parents and the conception of the object of scientific inquiry.

Perhaps among the monkeys the shortest span from generation to generation is not far from three years, and among the anthropoid apes approximately twelve years. These are guesses based upon the more or less well-established statements of hunters, directors of zoölogical parks, and naturalists. Undoubtedly, as in the case of man, the period could be somewhat reduced by control of conditions and express effort to facilitate breeding, but it is doubtful whether on the average, in its native habitat, the generation of any monkey is less than three years or that of any great ape less than twelve years.



A YOUTHFUL ORANG-UTAN, AT HOME IN HAVANA
It is Cachita or Misuita. The photographer is not sure which



Courtesy of Doctor LeSouef

AN AGED ORANG-UTAN

This picture shows the remarkable skin growths which appear in the old male orang-utan



KEEPING CLOSE TO MOTHER

Monona and Lita were too suspicious of the photographer to approach his corner of the cage

Like all other statements in this book, and especially all in this chapter on the life history of the individual, this is subject to correction on the basis of carefully controlled observations.

The sex behavior and activity of the monkeys and apes clearly show the influence of close confinement. There can be no doubt whatever that the sex activities of the individual isolated or associated with other individuals and the sex relations of mates or associates are greatly altered by the limitations of cage life. Special restrictions, as well as differences in nutritional and other environmental influences, must play a major rôle in the regulation of sex conduct. This is true of the caging of any active animal, but it is peculiarly important in the case of one so versatile and relatively intelligent as the monkey or ape. Close confinement restricts the opportunities for amusement and employment. As a rule the cage contains scant equipment for either work or play. A livelihood is provided without effort on the part of the animal. It has nothing to work for, nothing to amuse itself with except itself, its companions, and perchance a few pieces of apparatus such as a chain, a swing, a trapeze, some straw, and food dishes.

It is not beside the point to ask what would happen to us, similarly placed and restricted sharply in freedom of movement and in environmental re-

sources. Imagine either the isolated individual or the sexes thus confined. Can there be reasonable doubt that human behavior would be essentially different from that which we observe under present natural conditions? Perhaps the nearest approach in human life to that of the captive monkey or chimpanzee whether at Quinta Palatino or elsewhere is the existence of the imprisoned criminal. Next comes that of the insane person who for his own protection or the safety of society must be confined under guard.

The point of these remarks is to offer a background for observations concerning self-abuse in the monkeys and apes. It does occur in both sexes, but by no means so commonly as might reasonably be expected under the circumstances. Madam Abreu cites only one instance, that of the chimpanzee Chimpita who during the latter part of his life at Quinta Palatino developed bad habits and ultimately died of myelitis.

CHAPTER 11

THE CARE OF CAPTIVE PRIMATES

IT would be difficult to exaggerate the importance of knowledge, on the part of those who desire or need to have captive primates, of suitable ways of keeping them healthy and contented and of breeding them in captivity. Madam Abreu, through her experience of the last twenty years, has added invaluable to our fund of practical knowledge, but it remains to make her observations widely available through publication. It is the purpose of this chapter to set forth certain prime essentials in the care of monkeys and apes.

The Abreu estate, Quinta Palatino, is delightfully situated on the outskirts of Havana. It has beautiful buildings and grounds, but, infinitely more important for the collection of primates, it has an abundance of fruit- and shade-trees so placed with reference to the cages that the animals must almost feel as though they were in their native habitat. This physical environment appears to be very nearly ideal for many, if not the majority, of the monkeys.

The climate of Havana is sufficiently mild throughout the year to keep the animals in comfort. There are cool nights even in summer, and during the winter the temperature may fall so low that nest boxes or rooms where the animals may seek refuge from storm or from cold are entirely essential. But these are desirable in any climate, for sudden changes of temperature are inevitable in the tropics as elsewhere, and against them the animals must have opportunity to protect themselves. In nature they are able to do this by crowding together closely, by seeking the shelter of thick vegetation, or by making nests in the trees of the dense forest or on the ground. But in captivity these resources are lacking, and a nest box, the size of which naturally varies with the type of primate, should be provided. There is nothing to indicate that a uniform temperature is even desirable, much less necessary, for any of the primates. Probably, as in the case of man, their continued health and normal existence are conditioned by variety. This certainly applies to food supply, and probably in most instances also to temperature and moisture.

About her splendid house in the Quinta Palatino park, and at a distance of fifty to one hundred feet from it, Madam Abreu has had constructed in a semicircle some fifty cages. They range in size from the small cages for marmosets, three or four

feet in diameter, three feet from the ground, and four to five feet in height, to the strong and spacious cage of Jimmy and his family, which is nearly sixty feet long, thirty feet wide, and twenty feet high. Cage design and construction vary widely in this primate paradise. The small types of cage usually consist of a wooden frame covered with wire and with a roof suitable to protect the interior from the rains and the direct sunlight. Doors are arranged for easy access by the keeper, to facilitate cleaning of the cage and handling and transfer of its inmates. The floors usually are made of cement or metal to protect them from the animals, to assure relative permanence, and to render cleanliness more easily attainable.

Some of the Abreu cages are very beautiful; others are notable rather for their utilitarian character. In several the steel framework which carries the roof and the walls of wire netting or steel rods is covered with a decorative coating of concrete in imitation of the trunks and branches of trees. This rustic effect is exceedingly attractive and appropriate to the setting of the cages as well as to their use. In general the cages used for the larger monkeys and the anthropoid apes are built with concrete floor resting on the ground, in which is set strong wooden or metal framework with sides and doors of heavy woven or link wire or of well-braced steel bars suitable to the size and

strength of the animal to be confined. The permanent roofs of these cages are made in some instances of metal, in others of wood protected by waterproofing materials.

In all cases the interiors are free from constructional features which can injure the animals. Much attention is given to permanence and indestructibility, because even the monkeys can with hands and teeth tear or shake to pieces a heavy cage if it is not especially adapted to withstand their modes of attack. Ordinarily, wooden cages are inappropriate, since the animals take great delight in gnawing the wood and in pulling or shaking the frame or its walls until the whole falls to pieces.

For the sake of convenience in cleaning, the cages are kept as clear as possible of obstructions. The cement floor is provided with a gutter on the edge and is so sloped that it drains into a pipe at one corner. This makes it possible for the caretakers whenever necessary to wash thoroughly the entire cage from the outside, with hose-directed stream of water. On the floor of the larger cages is a built-in concrete tub which can be used as a source of drinking-water, and on occasion also as a bath-tub. Ordinarily these tubs are not filled with water, since the animals play in it and thus render it unfit for drinking. Cleanliness

being one of the prime requisites for the maintenance of health in a primate community, it is provided for not only through foresight in planning and construction but also and quite assiduously by attention to the condition of the cages and the frequent and free application of water, with disinfecting and cleaning solutions.

The illustrations accompanying this chapter show several types of cage—some of them in sufficient detail to indicate with reasonable clearness the principal features of construction. Madam Abreu has one unique advantage in Havana. Metal grills, such as are commonly used to safeguard doorways and windows in tropical lands, are readily available second hand. She consequently has been able to buy cheaply from the wreckers of buildings large metal grills which if specially constructed for her would cost ten times as much. By selecting appropriate sizes of unit and weights of material, it has been possible for her to construct cages suitable not only for the larger monkeys but for all except the full-grown anthropoid apes. The sections can easily be bolted or wired together about a specially constructed wooden or metal framework. Thus with small expenditure, aside from labor, one can build in Havana a cage approximately twenty feet long by twelve feet wide by ten feet high, with suit-

able sloping roof, cement floor and nest or sleeping chamber, to house two, three, or four young chimpanzees.

A great point is made at Quinta Palatino of the proper combination of sunlight and shade. Cuba has an abundance of both, but sometimes they are difficult to regulate. It has required foresight and careful planning properly to design, locate, and construct the ape cages. They must be placed in proper relation to the trees which in the several seasons are expected to provide natural shade, but at the same time they should be so located that the chill winds of winter, or of late afternoon and night, of cloudy weather and of sudden storms, shall be tempered by natural or artificial barriers. There must be free circulation of air throughout the cage and the sleeping-room, and for a portion at least of each day the greater part of the cage should be sunlit. Yet at any hour of the day the animals must be able to retreat into the shade, for to be compelled to lie or sit in the direct sunlight is undesirable and may be dangerous. The cages therefore are provided with roofs which turn both water and sun.

One gets the impression in observing the life of the apes at Quinta Palatino that three features of domestic architecture are essential. Assuming that the animals cannot have their freedom during the day and play about at will, there must



A QUINTA PALATINO CAGE VISTA

The vista of chimpanzee cages directly in front of the entrance to the Abreu residence



TYPICAL CHIMPANZEE CAGES AT QUINTA PALATINO

In the middle of the picture is seen the concrete nest box or living room of one of the cages



CHIMPANZEE CAGE WITH CONCRETE NEST BOX IN CORNER

Despite its imperfections, the picture shows many features of cage construction.
The cage which occupies the center was built about a good-sized tree



A BEAUTIFUL MONKEY CAGE IN A BEAUTIFUL SETTING

The visitor is sure to linger at this spot, for the skillfully wrought cage houses
young military monkeys

be, as Madam Abreu has found necessary in order to protect her house and gardens, a spacious and secure inclosure. Either within or attached to this there must be a more protected and relatively small ventilated room to which the animals can retreat when cold and where they may spend the night in comfort. It is entirely possible to train them to use hammock or mattress in their sleeping-quarters, and to cover themselves. The latter they sometimes do in their natural state, using leaves, branches, or ground vegetation.

Finally, there should be a dining-room to which the animals may be admitted for their meals and where they should behave like well-trained children, eating what is provided and returning to the outdoor cage when the meal is finished. Of course this arrangement for the regulation of daily life, and especially for sleeping and eating, requires not only the regular attention of competent keepers or attendants but intensive training and discipline of the animals themselves.

Thus far Madam Abreu has not taken this step in the domestication of her pets, for instead of having them eat in a special room or cage she has each individual or group fed in its living-cage. In so doing she misses an important opportunity to vary the routine of the animals' existence and to afford them a chance for new adaptations and new adventures. At the same time, the humaniz-

ing of eating would have the very real advantage of assuring to each individual, be it weak or strong, its own proper portions of food. Cage feeding means that each individual scrambles for what it desires and that some get more, even if none gets less, than they need.

If we were reconstructing or supplementing the ape cages at Quinta Palatino, we should suggest a special dining-room or dining-cage within easy reach of the other cages, with a long table and chairs and with facilities for use as a playroom or school-room as well as a dining-room. In these directions Madam Abreu has experimented, but, as she puts it, she has never been able to find any one both able and willing to supplement her time and sympathetic interest sufficiently to train the animals to good feeding habits and to play and other performance which should yield systematic exercise. She says it can be done readily with one or two animals, but when one has a large family it is a serious undertaking. Undoubtedly she is right, and certainly she has gone far beyond the efforts or even the ambitions of most keepers in zoölogical gardens.

A provision in the distribution of the cages which must not be overlooked is such relation to one another that the animals can readily see clearly what is going on in near-by cages and thus share in the play and other activities of

their kind, even though separated from them by cage walls. This is peculiarly important for the great apes.

But the best of cages even in an ideal climate and with all possible advantages of natural surroundings would avail little without wise and appropriate feeding. It is therefore entirely pertinent to describe the daily routine in the case of the collection at Quinta Palatino and to set down Madam Abreu's advice, based upon her long and intimate experience, which has been successful at once in the maintenance of the animals in health and comfort and in promoting breeding and the normal development of young.

The routine varies somewhat as to hours, with the season of year, but the following is applicable to spring, summer, and early fall. At seven in the morning the animals are given bread or cooked cereal and milk. At nine o'clock, if mangoes or other native fruits are available, the keepers give some to all members of the colony.

About eleven, Madam Abreu makes a round of the cages, giving to each individual or cage group portions of cooked food from her table or any extra delicacy which she has available. In this social visitation friendly greeting and petting are quite as obviously appreciated by the animals as the bits of food which their owner distributes according to her knowledge of preferences.

About three in the afternoon comes the last regular feeding for the day by the keepers. The meal consists commonly of cooked food, including such vegetables as white or sweet potatoes, squash, and corn. Milk is often given at the evening meal. In season corn is sometimes fed green on the cob. Again, the meal may consist of baked plantain. The food supply varies with the season and at any one feeding variety is not sought.

What we know about the need or desirability of a balanced ration, of variety of food, of the necessity for vitamin-containing foods, as well as others, applies in the life of the apes as in that of man. Presumably the nutritional requirements are not identical from species to species, but they are so far similar that it is entirely safe to assume that a baby ape may be fed much like a child. In any case individual differences are conspicuous. Both cooked and raw foods are desirable and acceptable.

Madam Abreu's experience indicates that the infrahuman primates have likes and dislikes, preferences and prejudices, which affect foods as well as other aspects of environment. If convenient, there is no obvious reason why these preferences should not be considered. Otherwise the animals more or less readily and eagerly eat what is placed



GETTING DINNER AT
QUINTA PALATINO



OUR LABORATORY AT QUINTA PALATINO

This one-time residence of the superintendent at Quinta Palatino, Madam Abreu kindly placed at our disposal as a laboratory

before them. The problem in successful feeding of the monkeys and apes is rather to provide the proper variety, proportions, and total quantity of food than to find things which the individuals will readily and eagerly devour. A good general rule to follow is: Depend chiefly on fruits and vegetables.

Occasionally an ape will take raw or cooked egg or bits of meat. Of certain individuals it has even been reported that they were very fond of a meat diet and could live on it. Some authorities contend that they must have a certain amount of meat in order to thrive. This assumption gains no support from the experience of Madam Abreu, for she gives no meat to her gibbons, orang-utans, or chimpanzees. Milk, however, they receive in considerable quantity and most of them eagerly. There can be little doubt that many apes will occasionally eat, as do the monkeys, insects, birds and their eggs, and small mammals. But it is one thing to assert that the animals eat certain things and another to hold that they require them. The evidence suggests that a vegetarian diet is entirely adequate not only to keep the anthropoid apes in perfect health but also to enable them to breed and to rear their young successfully.

Certain food preferences exhibited by the chim-

panzees are amusingly interesting. After all, the apes, and to a less extent the monkeys, are very much like us in their attitude toward foods.

Jimmy, the lord of the chimpanzee colony, prefers pineapple above everything in his ordinary dietary. It must be admitted that the Cuban pineapple at its best is a wonderfully delicious fruit. His mate, Monona, prefers the banana. Of course there are bananas and bananas in Cuba, ranging all the way from the tiny fruit two or three inches long to the immense varieties, and in flavor from those we tolerate to those we "cry for." Doubtless if given opportunity Monona would discriminate among them. Fiffille and Lu Lu also are said to prefer the banana, but they, as well as Jackito and Blanquita, are extremely fond of oranges and mamey. Anumá, it is said, especially prefers mamey, although banana ranks second. The monkeys are fond of most fruits, but many of them seem to prefer oranges. Virtually all of the animals in the collection like corn, either green or cooked, but the baboons are peculiar in that they have a preference for hard corn, palm-nuts, and sunflower seeds. All are eager for cocoanuts, taking both the milk and the pulp.

Madam Abreu does not give the chimpanzees or the orang-utans any kind of hard grain, as she is afraid that it may cause digestive disturbances

because of improper chewing. She says that chicken fed to the gray gibbon caused serious bowel trouble.

To pregnant females and such as are nursing their young, Madam Abreu gives an extra quantity of milk. The baby chimpanzee is given milk and fruit also in addition to nourishment supplied by its mother, as soon as it will take such extra food.

Water is kept in most of the cages almost continuously so that the animals may drink whenever they wish, but when the water supply is of uncertain purity, or the animals habitually get it dirty, they are supplied with spring water about three times a day, each animal being given opportunity to drink from a cup in the hands of the keeper.

It is possible to discover by scientific means the proper dietary for a given type of primate or even for a given individual, but the amount of food to be given also must be determined. Over-feeding captive animals is a serious mistake. At best they have less opportunity for strenuous exercise, and therefore need less food than in freedom. It is a good rule to give them only as much as they will eat with eagerness. To have food lying about the cage between meals is bad. All things considered, it is better to have pets slightly underfed than obviously overfed. Madam Abreu, however,

insists upon an abundance of food and by feeding the animals frequently rather than much, avoids having it lie neglected in the cages.

Undoubtedly the ideal method is to feed the animals individually, supplying to each just what it can eat readily and to advantage, precisely as in the case of a person. The animals can be trained to eat neatly from food-containers and even to use a spoon in feeding themselves. The food can be offered then by courses or in such other way as is appropriate and the whole procedure conducted in an entirely orderly manner.

Madam Abreu has the habit of taking some of the animals, including the orang-utans and the majority of her chimpanzees, into her house for the night. They are caged securely. Her idea is that they are in this way protected from risk of taking cold or contracting pneumonia from exposure during the cold nights which come not only in winter but occasionally at other seasons. To such animals as happen to be in the house, she regularly gives milk at eight o'clock or when she returns home if she has been away for the evening.

Those animals which are not left in their cages overnight are taken into the house from four to seven in the evening, in accordance with the season and the condition of the weather. After their evening feeding they usually go to sleep at

once. In the morning between six and seven o'clock they are returned to their outside cages. Jimmy alone, of the chimpanzees, is never removed from his outdoor cage. At night he is fastened in his sleeping-chamber and early in the morning given access to his large cage and fed. Even Anumá and Monona, although very large and strong, are each day transferred from house to outdoor cage in the morning, and from the latter to their smaller house cages in the evening.

The gray gibbon, although recognized as one of the more delicate and difficult of the anthropoid apes to keep, remains in her outdoor cage both night and day. She is provided with a small nest box and there is no evidence that she is less healthy or contented because of the slight which is implied by Madam Abreu's failure to take her in with the orang-utans and chimpanzees. She goes to sleep shortly after sundown but, we are told, "is always awake to salute the rising sun." Most of the monkeys also retire at sundown and awake to resume their activity as soon as it is light.

The great ape colony at Quinta Palatino has many points of interest. A finer collection of chimpanzees probably does not exist in captivity, nor can more generally favorable conditions be found, for the climate of Cuba seems to suit them admirably. But it is doubtful whether it is at all

necessary to take the animals into the house at night as is habitually done, for the great male, Jimmy, lives a perfectly healthful life, though he remains in his outdoor cage the year round. We are inclined to believe that their owner humors the animals somewhat unnecessarily, at the same time indulging her own sympathetic interest in them and her eagerness to be good to them. Almost certainly they could be kept in splendid physical condition if in connection with each of the outdoor cages there was provided a well-ventilated and otherwise-comfortable and hygienic nest or sleeping-chamber. Most of the cages already have such a compartment, but for the reasons which she has indicated, and we have added to, Madam Abreu prefers that the chimpanzees and orang-utans sleep in special cages which are set up in her house.

Although this chapter necessarily deals in generalities, it cannot be too strongly emphasized that the different types and species of primate make quite different demands on their physical and social environment. With reference to climate, it is to be remembered that some are adapted to cold climates and live even in the snow, whereas the majority apparently prefer high temperatures and are found in tropical or subtropical regions. Similarly, some are strictly vegetarian, a few nearly carnivorous, and the majority, like

man, have adopted a mixed dietary. In the sphere of social relations the majority are distinctly eager for companionship, while by a few isolation seems to be preferred. When one is selecting a pet and trying to learn how to keep it successfully or to encourage the breeding of a pair, such things must be taken into account and conditions accommodated to the facts.

It is one thing to keep captive animals, and especially captive primates, healthful and contented; it is quite another to induce them to breed and to rear their young successfully. On this subject Madam Abreu says:

“The animals, to be healthy and to breed, must have fresh air and trees; they need many trees. It is the environment that counts and this is the same with all animals. All must be happy and contented before they will reproduce. They seem to know that if their surroundings are not right, their children will not be happy in captivity, so they have none.”

And again, in reply to the question: “Why is it that monkeys and apes when kept in zoölogical gardens and circuses so seldom breed?” she replied, “Because they need the atmosphere, the air, oxygen, and liberty. You cannot keep them closed up. They need air and trees more even than food.”

There can be no doubt that the lady is correct

in her emphasis on the extreme desirability of fresh air, sunshine, and a natural-appearing environment such as is furnished by abundant vegetation and especially by shade- or fruit-trees. Nevertheless, the writer's experience strongly suggests that other environmental factors are equally important, and he differs with Madam Abreu in believing that the dietary is of supreme importance for health, growth, and reproduction. From what he has observed at Quinta Palatino and what its mistress has reported, he believes also that breeding is markedly influenced by both species and human companionship, and that in the anthropoid apes especially the social environment has much to do with reproduction and the care of the young.

There are several records of chimpanzees being born in captivity, but usually the story quickly ends with the death of the infant. It is my suspicion that the trouble usually is nutritional. Only at Quinta Palatino has complete success been attained and there, thanks to Madam Abreu's wisdom and devotion, the story has been continued uninterruptedly from the mating of apparently normal chimpanzees to the maturing of the Cuban-born animal Anumá.

CHAPTER 12

THE SECRET OF SUCCESS IN KEEPING AND BREED- ING THE GREAT APES

THE more highly developed an animal is mentally, the more difficult it is to keep it satisfactorily in captivity. Perhaps this is chiefly because mentally complex creatures require, in addition to the ordinary physical environment, certain psychological and social conditions. In the preceding chapter attention has been directed to those aspects or factors of physical environment which seem to be essential to primate health, development, longevity, and reproduction. The account might have been entitled "Rooms and Board for Primates." For this chapter has been reserved consideration of those factors which we think of as social or mental. They are especially significant for the great apes.

It is in no wise surprising that the great apes should have fared ill in captivity. Their needs and desires were little understood; they were placed in wholly unusual, unnatural, and often unhygienic surroundings, were often separated from their kind and kept in social isolation, and

were given wholly inadequate resources for exercise and amusement. Small wonder, then, that the history of the gibbon, the orang-utan, the chimpanzee, and the gorilla in traveling shows and in private collections of pets has been a series of tragedies! Most of the types of anthropoid ape have acquired the reputation of being delicate, highly sensitive to certain diseases, or for other reasons peculiarly difficult to keep in captivity, and virtually impossible to breed and rear.

The gibbon at Quinta Palatino is considered the least hardy of all. Elsewhere it has been discovered that the species of gibbon differ markedly. With these animals practical experience ranges all the way from utter failure to remarkable success. Sometimes an individual lives for many years in captivity.

The orang-utan and the chimpanzee have proved easiest of all the anthropoid apes to maintain in confinement; the orang-utan perhaps because of its native vigor and resistance to diseases, and the chimpanzee because of its relative hardiness and cheerfully adaptable temperament. Nevertheless the history of both of these types in exhibition places was until recently very discouraging. The majority of individuals captured during infancy or early childhood live from a few days to a few months. Few indeed, perhaps not

more than ten per cent., survive to reach maturity. Especially in zoölogical parks, where conditions are supposed to be on the whole very good for the life of captive animals, the life span of the orang-utan and chimpanzee has been measured in months instead of in years as of course it should be. The only encouraging thing about the situation is that the directors of zoölogical gardens, and others who have to do with the great apes, have learned many important lessons, and are so far profiting by them that to-day the orang-utan and the chimpanzee are living much more healthfully, contentedly, and continuously in captivity. Not a few of the world's leading zoölogical parks and several circuses and animal-trainers have succeeded in keeping individuals for several years.

Most tragic of all is the history of the gorilla's relations to man. He, perhaps because of his temperamental resistance to subjugation and his inability to become reconciled to lonesomeness, has perished where the orang-utan and the chimpanzee flourish. Where the captive life of the latter has been measured in months, that of the gorilla has been measured in days. Until within a few years there was no record of a gorilla having been kept in captivity, outside of Africa, in a reasonably healthy and contented condition for more than a few weeks, and in these cases the individuals were immature.

Miss Alyse Cunningham has written an entirely new record, for she, by wise care and sympathetic devotion to her pets, has succeeded in keeping three young gorillas at various times for periods of from a few months to several years. The first of her gorilla friends, John Daniel, she kept until he was so large that it was no longer practicable to have him as a member of the household; the second, having been injured when he was captured, after a few weeks in her possession died of concussion of the brain; and the third, Sultan or John Daniel Second, already a captive for two years, is flourishing mightily and gives every appearance of being as healthful, contented, and happy in his human environment as a gorilla could well be in nature.

Perhaps, then, we are on the threshold of a reversal of human experience in relation to the great apes. The lesson may have been learned that from the gorilla to the gibbon they must be treated much as persons would be under similar circumstances. There can be no doubt from the lessons which Madam Abreu's experience teaches, and from the daily demonstrations at Quinta Palatino, that this is precisely what is required for the successful breeding of the primates. They may be kept alive under other and relatively unsatisfactory conditions. This is attested by cases of great apes which, although badly deformed be-

cause of early injury or unhealthful conditions in captivity, survive year after year. There is a great and, to the uninitiated, surprising difference between the physical and social requirements or demands of the anthropoid apes and those of the more lowly types of primate, even including the monkeys. Undoubtedly the outstanding feature of this difference is social or psychological. Almost all of the primates like companionship, but there is good reason to believe that the gorilla cannot live normally without it. He becomes sulky, despondent, and—like chimpanzees or orang-utans captured when adult—he may refuse to eat, and thus end his life.

Perhaps the primates are increasingly temperamental from the monkeys to man, or perhaps it is more nearly correct and more illuminating to say that, being more highly endowed mentally, they have needs which correspond to their experiences, and demand of environment not merely the physical factors of shelter and nourishment but also social conditions such as are fulfilled through companionship or group association. Although intelligent care—covering sanitary conditions, feeding, and regulation of exercise—is absolutely essential, these alone are inadequate to maintain a great ape in the best of spirits.

Both zoölogical parks and circuses have the great advantage of supplementing physical en-

vironment by affording abundant opportunities for companionship and display. The great apes, with the possible exception of the gibbon, have an innate love of acting. They delight in attracting attention and with visitors before them they are at their best. These factors of their environment may in large measure take the place of social relations with mate, offspring, or other members of the family group. So a trained orang-utan or chimpanzee may live very contentedly under what might seem rather trying physical conditions. For many months recently the little gorilla Sultan has been on exhibition in a great American circus. Not only has he survived this experience, unique though that fact is, but he also has grown, and ends the "season" in the pink of condition. But all the while he has been treated with quite as much intelligent and sympathetic care and consideration as a child.

With few exceptions, the primates are social creatures. They may not be socially minded in the latest sense of that phrase, but they seem as eager as humans for the company of their kind and as dependent upon it for contentment and happiness. Companionship and play are not a whit less important to their health, comfort, and contentment than such factors of physical environment as temperature, moisture, food, and drink.

No primate, if it can reasonably be avoided, should be kept in isolation. At Quinta Palatino there are few instances of lone animals. Wau-Wau the gibbon is forlorn, and her lonesomeness gives her owner much concern. Jimmy is contented largely because of the companionship of wife and daughter, but if he were isolated he might still have visual access to his fellows and thus share in the community life. Madam Abreu has grasped and effectively utilized the important principle of sensory contiguity and association in establishing her primate colony, for the cages are so placed that, while protected from sudden storms and the intense sunlight of the tropics, they enable the animals to enjoy companionship even beyond their cages. In fact, it is seldom that one animal can do anything by way of amusement or exercise without attracting the attention of others in distant cages and having the activity shared through suggestion or imitation.

Species companionship, eminently desirable and obviously natural though it be, may to a certain extent be replaced by human association. Thus it appears possible for a person to maintain a captive primate in good condition and contentedly through intimate friendliness. This fact has been demonstrated not only in countless instances with various types of monkey, both small and large, but also with the great apes, among which

the gibbon, notable for its desire for companionship, is known to become very much attached to people and to accept human friendship cheerfully in lieu of association with members of its kind.

For all of the animals at Quinta Palatino there is abundant human companionship, which in some cases materially and in others incidentally supplements or replaces species companionship. This is important because most of the primates come to regard with interest and more or less manifest affection persons who control their means of subsistence and are friendly. Presently a monkey or an ape may come to behave toward a person much as it would toward one of its kind, acting to attract attention, seeking in various ways to share in activities, and above all using various tricks to encourage play relations.

This brings us to another aspect of environment which, in part physical and in part mental or social, is of the utmost importance; namely, opportunity for work and play. In the young of all primates, random and varied play is much in evidence. Monkeying and aping seem to be always in order. As the animals become mature, this excess of activity gradually disappears, to be replaced by more leisurely and definitely directed acts which look very much like work. There are amazing individual as well as species differences in attitude toward self-expression through play



Reproduced from Brehm's "Tierleben"

ATTITUDES OF A YOUNG GORILLA



CACHESITA IN
ACTION

or work and in both amount and variety of such expressions.

Undoubtedly, kindness to captive primates demands ample provision for amusement and entertainment as well as for exercise. If the captive cannot be given opportunity to work for its living, it should at least have abundant chance to exercise its reactive ingenuity and love of playing with things. The writer well remembers a monkey among his scientific subjects who would actually use a hammer to drive nails and a saw to make a noise on wood or metal. Provided with a few objects which he could manipulate, this monkey would amuse himself for hours at a time. The greatest possibility of improvement in our provision for captive primates lies in the invention and installation of apparatus which can be used for play or work. This demands ingenuity, for the objects must be virtually indestructible and in the case of animals which are caged together, of such nature that they cannot be used by one individual to injure another.

During the several important periods of ape life the requirements of physical and social environment differ more or less radically. Beginning with infancy, the individual is relatively helpless for several months and, in the case of the three great apes, remains in the care of its parents for from one to three years, barring acci-

dental separation. Throughout the period of infancy the mother nurses her offspring. For several months she is virtually the sole source of nourishment. Then the infant, having acquired, with the help of parental tuition, ability to walk and run about, begins to supplement the diet of milk by gathering and testing fruits, berries, roots, insects, and other living things. There is much experimenting in this, and the ape baby, like the human infant, learns daily through its contacts with environment.

It seems that the infant is regularly carried, guarded, and protected by the mother. In the early days it clings to her tenaciously. Later, having acquired partial independence with its ability to walk, it rushes to her and securely establishes itself on her back whenever anything alarms it or when it is called by her. A most common sight in Jimmy's family was Monona quietly walking about the cage with little Lita firmly ensconced on her back. If everything was quiet and the animals entirely undisturbed, the baby might be sitting upright, holding to her mother's coat only with her feet, but if the animals were alarmed or nervous, Lita would be seen pressed close against her mother's back, holding on for dear life by both hands and feet. In this position she could cling securely even though her mother rushed about, climbing the

walls of the cage excitedly or otherwise disturbing the natural equilibrium of her burden. So far as we could learn, Jimmy has never been seen to carry the baby in this way, although he frequently plays with it and even chases it about the cage.

In these family arrangements are seen suggestions of essential factors in social environment. If we take our cues for the care of the infant ape from what we know of domesticated mammals, such as the cat, dog, horse, pig, or cattle, we shall either fail completely or succeed imperfectly in rearing and training our subjects. For whether or not we like the fact, apes are so nearly human that what meets our needs in physical and social environment tends also to meet theirs, whereas what adequately meets the needs of the four-footed animal, intelligent though it be, may be unsatisfactory for the ape.

The childhood of the ape is imperfectly known. Madam Abreu observed the development of Anumá, but, apart from playfulness and certain incidents indicative of individual peculiarities of temperament and intelligence, there is little to record. In this period it is definitely known that the individual emerges from the parental dependence of infancy to a degree of independence which enables it to shift for itself in captivity and to get on, in case of necessity, in the wild, either by adhering to another family group or by associating

with brothers and sisters instead of with parents. With captive apes, the utilization of the first five years of life for training in seemly and healthful personal and social habits, is most important. This, although it may be time-consuming, assures convenience in the later management and care of the animal. To educate, re-educate, or reform a mature anthropoid ape is next to impossible, and even among the immature ones there are many individuals which are not worth the time of training. When the adolescent period begins, the responsibilities of the parent rapidly wane and the young ape associates more and more with individuals of its own age.

Quinta Palatino supplies in its chimpanzee colony abundant opportunity to observe the daily life of adolescent males and females. Anumá is at the end of adolescence and about to emerge into mature chimpanzeehood. Jackito, much younger and immature for his age, is in the very midst of adolescence. In the natural behavior of these caged young things, sex play frequently appears, perhaps more frequently than normally because of the limitations of caged existence, and, in the females, also the tendency to personal adornment. This we have repeatedly observed in females of adolescent age but never in males.

Beyond the age of adolescence the maintenance of an ape in health, comfort, and contentment is

relatively easy apart from the difficulties of sex life with its disturbing demands. The adult is more hardy and seemingly more resistant to prevalent diseases than is the immature individual, and also less dependent upon varied activity and opportunities for social and especially for sympathetic relations.

Although Madam Abreu very strongly insists on the importance of certain factors in physical environment and doubts the significance of others, it is our opinion from conferences with her in which we have tried to enter fully into her practical experience, and from observation of what actually happens day by day at Quinta Palatino, that physical environment is insufficient to assure success in what she is doing, and inadequate to account for the behavior of her pets. We believe, and in this we hope that she may agree with us, that there are certain subtle benefits from the social relations of the animals among themselves and from their association with persons, especially with their deeply sympathetic and understanding owner and with her carefully chosen and experienced helpers. She has repeatedly told us that captive animals will not breed unless they feel that their young will be "happy." We suspect that in this statement she really implies the benefits of social environment. Only relatively unintelligent animals can maintain themselves

successfully on the basis of physical environment alone.

Injuries and diseases must be faced by any one who undertakes to keep monkeys or apes. Although many of them bear close resemblance to our own physical difficulties, there are significant differences which it is useful to know about.

To begin with injuries, it is rarely indeed that they are self-inflicted, or that by untoward accident, in handling or playing with objects or in running about or climbing, the animals come to harm. Occasionally they cut themselves in improperly constructed cages, but more often they are hurt either in play or in serious attack by companions or other animals. Such injuries usually are trivial and readily treated. The only precautions exercised at Quinta Palatino, and they are wholly approved by the experience of the writer, are cleanliness and the application of some bad-tasting or ill-smelling antiseptic preparation which is at once useful to keep the wound free from dirt and to prevent the animal or its companions from disturbing it. Broken bones, Madam Abreu says, are rare in her experience and are almost always the result of fighting. Except in the case of dire necessity, bandaging is undesirable, first because unnecessary, and second because the animal, unless constantly watched, may do more harm in its attempts to remove the

bandage than would result from leaving the wound open. Severe cuts and broken bones should be treated with the technique of human surgery. The use of local anæsthetics Madam Abreu approves, but she strongly advises against chloroform and ether as general anæsthetics.

Among the several physical agencies which are likely to give trouble in captive primates, are external and internal parasites. The former seldom appear in a serious way, for the animals are naturally careful of their bodies and if given half a chance will keep themselves entirely free of organisms which otherwise would infest the hair or skin. Madam reports one case of a chimpanzee which when purchased was covered with lice. The state of the animal reflects most unfavorably on its human care, for there can be no doubt that with ordinary opportunity the chimpanzee would have rid itself of this external parasite. Occasionally, however, some parasite may appear in a primate colony, and in that case prompt attention is essential. Usually the discreet application of such solutions as bichloride of mercury or carbolic acid will prove effective.

Internal parasites are almost certain to give trouble sooner or later. A great variety of worms infest the digestive tract of both monkeys and apes. The roundworm, tapeworm, hookworm, and various others are known to occur more or

less commonly, and each requires specific treatment. It is not possible to give sufficiently detailed suggestion or advice in this connection safely to direct one who faces such an emergency. From her experience Madam Abreu recommends the use of Fahnestock's Vermifuge. Purgatives also are frequently necessary, and those used for children and adults are effective. Especially in the case of the anthropoid apes, it usually is easy to get the animal to take the medicine if given in the form of candy or in sweetened water, fruit juice, or milk.

It is almost a superstition that monkeys and apes die of tuberculosis. There can be no doubt that certain types of primate are peculiarly liable to tuberculosis, but on the other hand certain other types are either peculiarly resistant or seldom seriously troubled by it. Nevertheless, it is eminently wise for the keeper of primates to guard them against exposure to this disease. Newly acquired animals should be given thorough physical examination and the tuberculin test. Both Madam Abreu and the writer have used this test intracutaneously, in the skin of the ape's ear or arm. Although it may not be perfectly reliable, it certainly is well worth the trouble of trial, for in case of positive result it gives warning, and in case of negative result, reasonable assurance of freedom from infection.

Dr. Herbert Fox (20), in a book on the diseases of captive animals, offers valuable information and advice. Certain respiratory diseases are frequent and many primates are highly sensitive to pneumonia. It seems to be a prevalent impression among those who are fairly familiar with monkeys and apes that the majority of captive primates die from tuberculosis or pneumonia. It is obviously desirable on this account to guard against the communication of these diseases by attendants or visitors. Although in nature the animals may be fairly free from such troubles, in captivity they are at a serious disadvantage and the least the human caretaker can do is minimize the risks of infection. For both tuberculosis and pneumonia the treatment, so far as knowledge goes at present, follows the course of human experience.

Madam Abreu has had several sad experiences with these diseases and has lost both monkeys and apes from tuberculosis and pneumonia. It is worth while to suggest that tuberculosis not uncommonly in the primates affects the abdominal organs and completely upsets the digestive system, although it may also attack the lungs. When the condition is primarily abdominal, the abdomen becomes distended and the inexperienced person may be misled into suspecting a digestive disease or a dropsical condition.

Despite familiarity with the susceptibility of the great apes to tuberculosis and the danger of infection spreading in their colony or throughout the primate community, the mistress of Quinta Palatino has not established isolation quarters for diseased animals or for those recently acquired who may carry disease. She has told of several experiences which indicate that diseased animals brought to her place have infected other members of their species or other types of primate, thus causing serious inconvenience and some fatalities in the collection. Two chimpanzees and some monkeys have been lost by this sort of unfortunate accident. Evidently, and in this we are sure Madam Abreu would heartily agree with us, the part of wisdom is to keep newly acquired individuals in an isolated cage until their freedom from communicable diseases and their healthy condition is virtually assured, and to isolate any member of the community who becomes ill.

There are various tropical diseases affecting the blood and digestive system which appear in one or another type of primate. All of them require the employment of medical experience and skill, and especially that of the physician who is familiar with tropical diseases.

Practical experience at Quinta Palatino indicates that it is always essential to watch the con-

dition of the bowels and to regulate food supply and feeding in accordance therewith. The condition of the mouth also is highly important and serves as a good indicator of the state of health. Temperature and pulse, if relied upon, must be used in relation to the norms for the individual and the species. It is known that there are very marked differences in different types of primate and that the diurnal temperature range is remarkably great in some of the monkeys and apes.

All of these matters have the utmost significance for those who would keep primates captive as pets, as performing animals, or as subjects of scientific inquiry.

Madam Abreu's experience with primate diseases, to sum it up, suggests the extreme desirability of guarding against tuberculosis, pneumonia, infectious diseases of the digestive system,—such for example as amœbic dysentery,—and internal and external parasites. If initially free from such physical menaces, an individual or group of apes may, with proper attention to physical environment, protection, care, and companionship, be kept in good health, barring such accidents as are inevitable even in a human group.

There are apparently individual as well as species differences in immunity or sensitiveness to disease-producing organisms or enzymes.

This appears from the history of the animals at Quinta Palatino and from the writer's observation of a pair of chimpanzees, one of which died of tuberculosis, whereas the other, although intimately associated with the victim of the disease for several months, presented no signs of infection.

Speaking of some of the peculiarities of her pets, Madam Abreu remarks that perspiration appears in the apes, but is seemingly difficult to induce; there are marked individual differences. Tears she has never seen in any primate except man. It is known that the tear glands are present in some of the other primates and certainly some of them give other evidences of weeping; yet the writer even by the use of tear gas in small quantities has never elicited tears in a chimpanzee.

Diseases and defects in the sense organs have rarely been noticed at Quinta Palatino. Deafness has never been observed. One case of near-sightedness in a monkey was commented on by Madam Abreu.

Growths in the nature of tumors or cancers have seldom been observed in the colony. One case is reported of an old rhesus monkey which developed a growth on his tongue. Finally this became so serious that he was put out of his

misery. Madam Abreu reported two or three other instances.

Although many persons dread the bite of monkeys and apes, fearing that it may be poisonous, no bad results have ever followed such accidents at Quinta Palatino. Madam Abreu has several times been bitten, as also have her attendants, but in no case has serious poisoning followed. It is her opinion that there is almost no risk except from a diseased animal or one whose teeth are dirty.

The monkeys and apes are to be congratulated on one thing. They seem to be naturally free from such diseases of childhood as mumps, measles, and whooping-cough, and there is no indication of any corresponding diseases peculiar to them, so far as experience with Anumá and Lita goes.

In speaking of essentials of sanitation and primate care, Madam Abreu says they are very simple: "fresh air, sunshine, pure water, and protection from draughts when the animal sleeps."

If, then, we were asked to sum up for the mistress of Quinta Palatino, as well as ourselves, the essentials of success in keeping and breeding the higher primates, we should emphasize the following points: freedom, or reasonably spacious quar-

ters; fresh air and sunshine, preferably coupled with marked variations in temperature; cleanliness of surroundings as well as of the body; clean and carefully prepared food in proper variety and quantity; a sufficient and regular supply of pure water; congenial species companionship and intelligent and sympathetic human companionship, which, transcending the routine care of the animal, provides for the development of interest if not friendliness; and, finally, adequate resources and opportunity both in company and in isolation for work and play. Given these conditions of captive existence, primates originally healthful and normal should without difficulty be kept in good condition of body and mind and should naturally reproduce and successfully rear their young.

Whether or not the secret of Madam Abreu's success in keeping the great apes contented and in getting them to breed, has been discovered and adequately described we cannot tell, but at any rate serious effort has been made to get at the facts, and what seems most important has been presented in these pages. Possibly in this chapter the significance of social environment, and especially of the human aspects of it, has been over-emphasized. Certainly Madam Abreu would say so. But the writer is of the opinion that it

is safer to err in this direction than in the opposite.

The story of Madam Abreu's persistent, intelligent, and determined efforts to establish natural and attractive conditions of life for her chimpanzees has been very inadequately told, but the fragments which have been presented will serve to indicate the numerous difficulties encountered, the exacting obligations of one who assumes such responsibility, the immense amount of painstaking labor, and the very considerable monetary cost of success. Certainly, in the pains which she has taken, in the exhibition of patience, sympathy, and willingness to do her utmost to understand the life of the animals, as well as in her ultimate success, the lady is unique. Her achievement in a difficult undertaking will inspire others to try, and her experience will guide them.

CHAPTER 13

THE LIGHT THAT FAILED: A TRIBUTE TO PRINCE CHIM

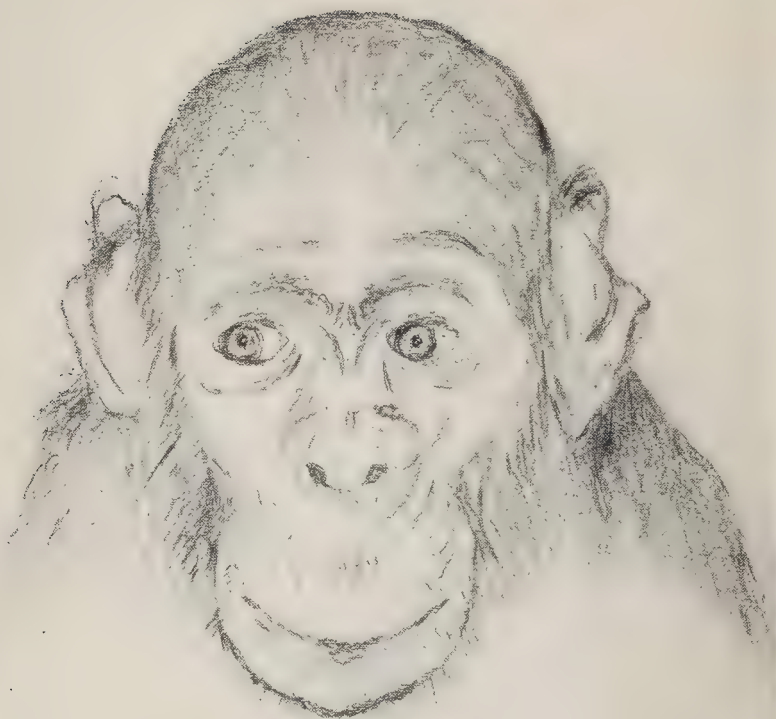
IT is only by accident that this chapter belongs in the story of Madam Abreu's work with primates. It is written because in all my experience as student of animal behavior I have never met an animal the equal of Prince Chim in approach to physical perfection, alertness, adaptability, and agreeableness of disposition.

He was a little chimpanzee who came to me by way of England, from somewhere on the eastern border of the Belgian Congo. By all who saw him he was recognized as an unusual type which rarely is seen in America. When I received him in August, 1923, he was said to be under two years of age, but it is reasonably certain, in view of the condition of his teeth and his degree of physical development otherwise, that he was considerably older, perhaps even as much as four years of age. I first saw him in the New York Zoological Park, where, with a little female companion, he was being kept until his owner could dispose of the pair. I purchased them and had them sent to New Hampshire, where during the re-



CHIM AND PANZEE WITH A FRIENDLY SCIENTIST

Taken at the writer's country home, Franklin, New Hampshire, in the summer
of 1923



PANZEE, DRAWN BY DAVID YERKES, AGED ELEVEN YEARS

Panzee proved a good model, but Chim wore out the artist's patience

mainder of the summer and early fall I cultivated their acquaintance and arranged conditions to reveal their adaptability and power to solve problems. It was my desire and hope to rear these two likely apes to maturity and to observe intimately and carefully their individual characteristics of intellect, temperament, and physique, and obtain an accurate record of their life history from the moment of purchase.

The female was called Panzee. Too late it was discovered that she had tuberculosis. To the extraordinarily healthful conditions of life on a New Hampshire hill farm, where she was treated with the greatest consideration and fed discriminatingly and abundantly, she responded with great improvement in physical condition.

It would not be easy to find two infants more markedly different in bodily traits, temperament, intelligence, and their varied expressions in action, than Chim and Panzee. Here are just a few points of contrast. His eyes were black and in his dark face lacked contrast and seemed beady, cold, expressionless. Hers were brown, soft, and full of emotional value, chiefly because of their color and the contrast with her light complexion. Chim's ears were small, set close to his head and fringed with black hair, whereas Panzee's stood out conspicuously, and were light in color and hairless. Their foreheads, noses, lips, and head

conformations also differed noticeably. Complete descriptions of the physique of the two animals well might suggest the query as to whether they were both chimpanzees. In reply I must say, so I was told by those who were supposed to know.

When it comes to animal temperament, we are at a loss for descriptive terms. Little Chim was notable for his bold, aggressive manner, his constant alertness and eagerness for new experiences. Seldom daunted, he treated the mysteries of life as philosophically as any man. Panzee was timid, nervous, hesitant before anything novel or new. When there was anything to learn by "trial and error," he took the lead and she followed at an eminently safe distance. Chim also was even-tempered and good-natured, always ready for a romp; he seldom resented by word or deed unintentional rough handling or mishap. Never was he known to exhibit jealousy. If I were to tell of his altruistic and obviously sympathetic behavior toward Panzee I should be suspected of idealizing an ape. Panzee could not be trusted in critical situations. Her resentment and anger were readily aroused and she was quick to give them expression with hands and teeth. Although too timid to attack an adult, she was known to attempt to bite a child who, by playing with Chim, aroused her jealousy.

One of the temperamental differences already mentioned is illustrated amusingly by the following incident in the day's work. Desiring to learn the weight of the animals, I took into the chimpanzee apartment a scale such as is commonly used for weighing babies, with the basket adjusted for the comfortable reception of an infant ape. Chim permitted me to place him in the basket and sat there quietly, interested but not a bit frightened, and balancing himself skilfully while I read the indicator. He was then removed from the basket, although desiring to stay in his novel position, and effort was made to repeat the performance with Panzee. When she was placed in the basket she immediately and hastily scrambled out with every appearance of alarm and extreme unwillingness to risk herself on the novel and unstable support. Although I tried several times to induce her to sit quietly in the basket long enough for an accurate reading of the indicator, each effort failed. Finally I hit upon this simple method of gaining my end. Taking both animals in my arms, I deposited them face to face in the basket. Panzee, instead of looking further for support, naturally put her arms about Chim, and before she had time to change her mind and clamber out, the combined weight of the animals had been read. Having thus been shown the harmlessness of the scale and basket she after-

ward climbed in of her own accord, as did Chim also, and the observer's troubles were ended.

Intelligence is a much-abused word, but it is more comprehensive than alertness, and I am going to risk using it. Everything seems to indicate that Chim was extremely intelligent. His surprising alertness and interest in things about him bore fruit in action, for he was constantly imitating the acts of his human companions and testing all objects. He rapidly profited by his experiences. To say that he was unique among anthropoid apes, or even among chimpanzees, would be rash on a few months' acquaintance and in the light of intimate knowledge of only a few of his kind, yet I do know with certainty that he, an infant ape, was remarkable alike for his observational ability, his varied methods and quickness of learning, and above all for his delight in "acting." Never have I seen man or beast take greater satisfaction in showing off than did little Chim. The contrast in intellectual qualities between him and his female companion may briefly, if not entirely adequately, be described by the term "opposites." Not only did she learn less and more slowly than he; her intelligence seemed to differ in kind. At first I thought that this was due chiefly to her physical condition, although perhaps in part to sex characteristics, or species or varietal peculiarities.

Of one thing with respect to the temperament and intelligence of Chim and Panzee one could be virtually certain; they would do quite different things in the same situation. Present a stranger, and the chances were that Chim would welcome him cordially with outstretched hand, while Panzee turned her back on him. If perchance both deigned to greet the visitor, he would be amused by the contrasting hand-shakes, for Chim's was heartiness itself. He gave his hand freely and frankly, and usually allowed it to rest an appreciable time in that of the recipient. Panzee offered hers somewhat grudgingly and, with fingers bunched as though to avoid unnecessary contact, she permitted it to touch the outstretched hand of the visitor, but almost immediately withdrew it with an air of relief and a suspicion of self-congratulation that she had safely ventured even so far. Not all visitors realized that this might be merely an indication of timidity.

Panzee, when transferred from the New Hampshire farm to the less favorable conditions of her city apartment, failed rapidly. She died in January, 1924. Chim flourished alike in city and country surroundings. In July, 1924, he accompanied me to Havana, furnishing throughout the trip entertainment to railroad employees and fellow passengers. Always friendly and playful, he was on this occasion unusually energetic and

eager for games. On our arrival in Havana he was taken to Quinta Palatino and on the following day introduced to Fru Fru, a white-face female chimpanzee, possibly somewhat younger than he, but about the same size. The little apes took to one another from the first and the greater part of their time was spent in active play in their large cage. Their games were mostly those of chasing and pulling, pushing, or hauling each other about. If one became quiet or started to do something for its own amusement, that was the sign for the other to disturb it and initiate a lively tussle or a game of tag.

Chim seemed perfectly at home and happy in his new environment. He had come from Washington, D. C., where in comfortable quarters he had spent the winter without illness or disability of any sort. Each morning when I came to Quinta Palatino to resume observation of the primates, Chim, even before I came in sight, greeted me with a cry of joy. It was not a prolonged scream but a sharp, vigorous, and impressive shout of welcome which I thoroughly appreciated.

Presently we began our experimental studies of the behavior of the chimpanzee, and Chim among others was given opportunity to display his ability to solve problems. My scientific associate, Professor Harold C. Bingham, in com-

paring him with other individuals whom we were studying under similar conditions, remarked that he seemed to be interested in the causes or conditions of things, whereas his companions did not. Then, too, he was much more active and resourceful, especially in the experimental situations which were used. Indeed, his behavior contrasted almost as markedly with that of his chimpanzee associates as did his appearance, for he was a little black-face with rather conspicuous nose, small ears, and a heavy coat of fine black hair, whereas most of them were white-face specimens with the typical chimpanzee nose, large, conspicuous ears, and much coarser and generally less thick coat of hair.

One morning some ten days after our arrival in Havana my approach to the chimpanzee colony was not heralded by Chim. I supposed that he was occupied with other interests and had therefore failed to notice my appearance, but on the third day which lacked a welcome, a more alarming explanation appeared. That day we took Chim from his cage to make some physical measurements. He seemed rather disturbed by our treatment and while we were working with him coughed several times. It was noticed that his hands and head seemed hot, so fearing that he had contracted a cold we returned him to his cage. Madam Abreu also had noticed his indis-

position. This marked the beginning of a very bad fortnight.

The following day it was clear that Chim had a serious cold. Within forty-eight hours one lung was affected and we suspected pleurisy. He had been removed before this time from his outdoor cage to a comfortable cage with a bed in the house, and was there given close attention both day and night. Within another twenty-four hours his condition had become alarming and medical assistance pronounced his case pneumonia. Our anxiety now became dread, for Madam Abreu knew from experience, and the rest of us from our reading, that pneumonia is one of the chimpanzee's most dangerous afflictions.

A negro nurse, quiet and sympathetic, was employed to look after the patient at night and everything that Madam Abreu's practical experience and the advice of her physician suggested as desirable was done for Prince Chim. Food he very early began to refuse and after the first three or four days of his illness, he took nothing but small quantities of such liquids as fruit juices, milk, water, and coffee. At first it was next to impossible to keep him covered, for he would tear off anything that was wrapped about him and throw off covers which were placed over him. Always extremely healthy, energetic, and independent, he persisted now in his eagerness to be



A PORTRAIT OF PRINCE CHIM



CHIM IN THE NA-
TION'S CAPITAL

entirely untrammelled and to move about as his strength permitted. In addition to the usual home remedies he was given hypodermically a remedy prescribed by the physician. This treatment he submitted to at first with fairly good grace, but as it was repeated he came to dread the pain of the needle and the discomfort of the injection, and it was clear that he greeted with anxiety mixed with eagerness every one who entered the room.

And so the suspense continued. For the first week we believed each day that if he lived through that day he surely would recover. But as the second week began our hope became mingled with despair. The animal's condition was obviously desperate. His temperature, earlier somewhat subnormal, had become virtually normal, 37° to 38° centigrade. His respiration, however, was extremely difficult, usually shallow, rapid, and painful. The heart action, from the first vigorous although necessarily rapid, gradually became weaker and we realized that even a perfect physique might not suffice to carry him through his illness.

Often as I entered the sick-room, I noticed that he was watching eagerly and although he welcomed me and sometimes even came to me from his bed, he seemed still to be expecting some one. Every footstep in the hall attracted his attention

and it was almost as though he anticipated the appearance of some one or something not present. On one occasion it seemed when I approached him as though he were either mentally disturbed or failed to recognize me.

As I sat by him one day, toward the end of the first week, he talked almost continuously, as though trying to tell me something. This unusual performance was very impressive, for it made one feel that, like a person, he was trying to convey certain meaning for which his vocal expression was inadequate. He was not excited, but seemed calm and intent on his task.

Finally the tragic day dawned. He seemed better in the morning, but toward noon it became evident that he was making a losing fight. Even then, however, and within a half-hour of his death, he was able to get up from his bed and cross the room to a cage which he climbed. He lay down on the top of the cage. Evidently he was in agony and could nowhere find relief; therefore his restless activity and the amazing show of strength even at the end. Then came the death scene, with the piercing cry, the rattle in throat, the less and less frequent gasps for breath, the open mouth, and the fixed, stony stare.

We were all greatly grieved by the loss of Chim, first because he was a valuable animal who had won a place in our affection, and still further

because he was actually a prince of his kind. Elsewhere his life history and characteristics have been described more fully [Yerkes and Learned (9)]. Here his untimely end is reported because his behavior even in death goes far to justify the title of this story, "Almost Human."

Doubtless there are geniuses even among the anthropoid apes. Prince Chim seems to have been an intellectual genius. His remarkable alertness and quickness to learn were associated with a cheerful and happy disposition which made him the favorite of all, and gave him a place of distinction not only in their regard but in their memories. Many, I am sure, who read this account will mourn with me the death of this little chimpanzee.

CHAPTER 14

KNOWLEDGE CONDITIONS POWER

WHEN one tries to encompass our knowledge of the infrahuman primates it is impressive, but when one imagines what we might know, our knowledge turns into ignorance. For although the monkeys and even the anthropoid apes have been known to man for hundreds and some of them for thousands of years, few of them have been exhaustively studied from any particular point of view, and least of all from that of the student of behavior, social relations, and psychology. Where we might reasonably expect and hope for accurate and detailed descriptions, we find only fragments, and these fragments, as has been suggested, give the casual or lay reader an exaggerated impression of extent and completeness.

More time has been spent on the external characteristics of the primates, which are useful in naming, identifying, and classifying them, than on their mental life or even on their bodily functions. Next in order of emphasis comes the study of their internal structure, anatomy,

histology, embryology, pathology. From these points of attack, and in certain aspects, many of the smaller primates and the anthropoid apes are fairly well known. Yet even the morphologist complains of the inadequacy of our comparative studies and persistently seeks opportunities to make new observations and to verify and correct old ones. In the realm of functions as contrasted with structures our information is hopelessly inadequate.

The reasons for the scientist's neglect of the higher primates are important only as their discovery and consideration may enable us to escape them. It might naturally be supposed that we should know most about the creatures in our world which, superficially at least, most closely resemble us. Why is this not true? There are several contributory causes, first among which is the relative scarcity of primates other than man in the principal areas of scientific inquiry. The monkeys and monkey-like animals as well as the anthropoid apes are, in general, denizens of the tropics or of the subtropical regions, whereas science flourishes and has developed most highly in the temperate zones. Supplementing this geographical factor is the relative nuisance, difficulty, and expense of keeping the animals in closely restricted captivity. Unlike many other wild creatures, they do not, generally speaking,

thrive and breed readily in captivity. In this connection it must be remembered that scientific inquiry and discovery have usually been ill-supported. The determined but self-sacrificing observer, eager to extend the bounds of knowledge, as a practical necessity has selected the most accessible, most easily dealt with, and most economically maintained materials for the study of his problems. Consequently the frog, small rodents such as the rat and mouse, the guinea-pig and rabbit, have been much used for biological inquiries, whereas even the commoner and more readily accessible of the monkeys have been neglected. In case of the anthropoid apes there is the additional essential fact of relative scarcity and high cost of specimens as well as of maintenance. These are some of the facts which appear when one examines the history of biology. Are they to restrict research in the future?

The economic status of science to-day is incomparably better than ever in the history of mankind. Popular understanding and appreciation of the significance of knowledge and of the application of scientific discoveries to daily needs constitute the basis for large public support and for private munificence which are enabling the investigator to go forward with more attention to the reasonable requirements and demands of his work and less to its material support. Under

these circumstances it surely is worth while to ask: What should we know about the primates, and how may we most satisfactorily extend our inquiries and provide for the thorough investigation of all aspects of the structure and activities of these creatures?

Our question and the inference have perhaps gone beyond our evaluation of the facts, for without presentation of evidence and arguments we have assumed that our relative ignorance of the primates is unprofitable and should be remedied. Doubtless the layman may reasonably ask for general if not specific arguments. To him it may well seem wasteful to spend large sums on the study of creatures which, although similar to us in many respects, apparently are economically valueless. But this is not the whole story, nor yet the logical beginning of it, for when one turns to the history of science and examines the relations of its progress to the development of arts, industries, and cultures, one immediately learns that the progress of civilization has been closely correlated with, and in many directions dependent upon, scientific inquiry and its discoveries. Indeed, it has become a tradition in several of the world's great cultural areas to consider science the forerunner of invention and the handmaiden of social as well as material progress.

Most of us readily admit that we cannot have

too accurate and detailed knowledge of our own organization and of its relations to environment. But some of us overlook the fact that many biological inquiries which are pursued with the hope of improving the conditions of human life may best be conducted, in some, at least, of their stages, with other animals as subjects. In studies of structure, function, and mind it often is far more difficult and expensive to use human subjects than other primates or other mammals. So the principal practical argument for the more extensive scientific use of the infrahuman primates is such increase of our knowledge of the facts and laws of life as will enable us more wisely and effectively to regulate or control individual, social, and racial existence. It is primarily an argument from economy.

With these general introductory considerations, we may inquire somewhat more particularly about the scientific possibilities and values of the primates. To the casual observer it might at present seem as though their principal use were to supply entertainment, since in stimulation of curiosity the monkeys and apes are without rivals in zoölogical parks and on the stage. The psychologist inevitably wonders why the monkey cage is so conspicuously a center of interest, luring adults of all conditions, degrees of education and insight, as well as children. Why

also the acts of the trained chimpanzee or orangutan always attract an audience, though in themselves they may be extraordinarily commonplace, and though the observers may frequently have seen like exhibitions of trained apes. Surely the likenesses amidst differences of monkey and man, their skill and dexterity in using hands and feet, their relatively high order of intelligence, and their emotional expressions are peculiarly fascinating to most persons and constitute a lure far stronger than that of other animals. But there is another factor which in many instances exceeds in importance interest in similarities. This is wonder and intellectual curiosity. Even the child cannot observe monkeys and apes in their daily life or in trick performances without wondering why the creatures are so like himself and yet so essentially different from what he thinks himself. Questions about genetic relations, origins, reasons for the evolution or development of such beings, the nature of their inner life of experience, and their possible immortality, come to a large number of apparently thoughtless and casual observers about the monkey cage.

It is difficult to exaggerate the attraction for most persons of the physically interesting varieties of monkey and ape. I am vividly reminded, as I write, of an experience in Paris. In those times of desperate reconstruction follow-

ing the World War I was one day wandering about the Jardin des Plantes. The great institution was unspeakably forlorn. Most of the animals had perished or been sacrificed during the days of strenuous need, and those few that remained in their cages or inclosures showed the pitiable effects of hard times. As I observed and pondered, I noticed a group of people—more than I had seen at any other place in the gardens—gathered about a large cage. On approaching I discovered that the cage contained three miserable-looking monkeys. Although a meager primate exhibit, these creatures attracted more attention than anything else in the great gardens!

Few persons would be likely to argue that the exhibition of primates, either trained or untrained, is comparable in theoretical and practical values with their scientific study. Nevertheless the zoölogical parks, circuses, menageries, and variety shows of the world have in the past fifty years spent hundreds of thousands of dollars to satisfy human curiosity, whereas only paltry sums have been devoted to the disinterested study of our nearest of kin. But comparisons are odious: still worse, they are usually misleading. What is needed is not diminution of the use of these animals for educational purposes but rather increase of attention to the scientific problems

which they present, and vastly greater popular support of work with them.

What, then, given interested investigators and support of their work, might profitably be done in the study of primates? In answer to this question several significant types of inquiry may be listed and characterized. They by no means exhaust the possibilities of research, but at least they illustrate and typify the primary interests of biological investigators; neither is the order of listing related to logical demands or practical values.

Naturalistic or field studies of the infrahuman primates are much needed, and this despite the fact that for many decades hunters, explorers, missionaries, and traveling biologists have gathered data and produced reports. There are thousands of pages descriptive of the life and habits of monkeys and apes, and yet for not a single species of primate is our knowledge of innate and acquired behavior (instincts and habits), temperament and emotional expressions, social life, relations to environment and life history even approximately complete. Where we most need reliable, systematic, detailed descriptions, we find observational fragments cemented together with guesses, some shrewd, some ridiculous. Certainly we never shall have a profitable working knowledge of any of these creatures until we know

their natural life and habitat intimately and accurately. Why, then, do we not provide for expeditions, observational stations, the support of field naturalists, so that this work may be done well instead of more or less incidentally and as chance affords opportunity?

Such naturalistic inquiries as the previous paragraph suggests would at once largely increase our knowledge of the behavior and mental life of the primates, and exhibit and define special problems whose solution might best be sought in well-equipped laboratories. As to the nature of the mental life or even the behavior patterns and educability of most of the infrahuman primates almost nothing is known. Read the thousands of pages of description which purports to deal with the monkey or the ape mind and you will be most of all impressed by the meagerness of the net result. The really considerable and valuable contributions to the psychology of the primate, always excepting man, can be counted on one's fingers. Except as we view the conditions of the progress of science, the situation is surprising and difficult to understand, for we naturally should assume that next to the study of the human mind, mind in other primates would command attention.

It would be grossly unfair to psychologists and psycho-biologists to say they are not interested in the mental life and behavior of the primates. In-

stead they are fully aware that anthropoid research promises to supply an indirect approach to certain problems in human psychology which hitherto have proved insoluble. Many of them are deeply interested, but few have been able to command even meager and inadequate resources for work which they much desire to do. Again, it is a question of practical difficulties, of the relative inaccessibility and costliness of primate materials, and in some instances also of the attitude of the layman toward serious scientific work with infrahuman animals. All newspaper readers know the price which the psychologist or sociologist is made to pay for his devotion to research with monkeys or apes. It is primarily humorous belittlement, ridicule, the exhibition of trivialities as though they were essentials. Ordinarily these things do not deter the investigator, but they do make it immeasurably more difficult for him to obtain the necessary opportunities and support for his work.

Intimately related to inquiries into the mental life of the primates are educational experiments. Until recently we had not suspected that monkeys, apes, and man had enough in common educationally to make it worth our haughty while carefully to investigate aspects of educability in other primates. But in the past decade certain ably conducted inquiries have shown us that some prob-

lems in education may be attacked more directly and economically by using monkeys or apes initially as subjects than by using children. The essential reasons for this are demonstrated points of similarity in the hereditary equipment and educability of the higher primates and man, and the feasibility of using the monkeys and apes in educational experiments which cannot reasonably or safely be undertaken at the outset with children. One may have no scruples about modifying the course of the life of a monkey, an orangutan, or a gorilla by certain novel methods of educational treatment, where one would refuse to take the unpredictable risks with a child. If, without just censure, we are to make radical and novel experiments in education, they must be made with other animals. Presumably they can be made most profitably with other primates.

There is the further important consideration that although the costs of working with monkeys and apes is relatively great, that of working with children or adults is much greater. So even if humanitarian considerations, including the welfare and safety of the human subject, be not objections, it is obviously worth while to initiate some experiments in education with other primates; and having made certain exploratory progress, defined problems and developed methods, to con-

tinue, with the great advantages thus gained, by studying children or human adults.

When one stops to consider that our pedagogical procedures are accepted and used more largely on the basis of precedent and convention than because of any reasonable certainty that they are, all things considered, the best procedures which we could command, an inspiring vista for educational research with the infrahuman primates opens before us. We might very well, by taking careful thought and spending a small fraction of our material resources on primate research, improve greatly our educational methods and even our educational systems. Certainly the monkeys and apes would not begrudge us this gain. It is merely a matter of human foresight, insight, originality, initiative, determination, and faith.

Much that has been written of the possibilities of profitable educational research with the primates applies similarly and with equal force to the investigation of social problems. Naturalistic studies of the primates should give us adequate working knowledge of their social relations and organizations, and of the chief factors of their social environment. There might appear, also, significant facts concerning social evolution and development, eugenic and euthenic practices or opportunities. And this information might en-

able us to see in a quite different light our own particular and perhaps peculiar social problems.

We may not be eager to admit it, but it is none the less true that human social psychology and sociology are only slightly developed. May we not, perhaps, give them a great impetus by thoroughly acquainting ourselves with the facts and principles of social life and its resulting organizations in our nearest of kin, the anthropoid apes? May we not with them experiment almost without limit on the modification of social factors and forms, on the production of new types of individual or social unit, on the relations of the individual to controlled factors of social environment? In a word, may we not, with the solution of human social problems at heart, carry out with the aid of our primate kindred inquiries in experimental sociology and social psychology whose results may be expected to point the way to direct attack on human problems and to the experimental study of human relations and practices which we might not otherwise venture to consider short of many generations?

Our point of view is constant; our arguments cumulative. What can be said about the study of problems in hygiene, preventive medicine, curative medicine, surgery, and allied practical arts, is essentially similar to what has already been remarked relative to the study of educational and

social problems with the infrahuman primates. As always, the degree of biological resemblance of the animal to man is a primary consideration. It happens, we already know, that from the points of view of the hygienist, physician, and surgeon the higher monkeys and anthropoid apes in essential respects stand close to man. In common they are subject to many infectious diseases. Their reactions to accidental injuries and many other types of environmentally induced bodily disturbance are strikingly similar.

This knowledge has not been wide-spread, so it is not so very surprising that experimental medicine has made only sporadic and relatively slight use of monkeys and apes. Generally speaking, human subjects are more readily commanded for medical needs because of clinical and hospital resources and facilities. But the day has now dawned when investigators in hygiene, medicine, and surgery are eagerly and actively seeking opportunities to initiate investigations with other primates. It requires scarcely more than ordinary imaginative ability to see rare possibilities of economy and research progress in the extensive use of monkeys and the occasional use of the great apes for varied lines of medical research. Bacteriological investigations, study of the causation and treatment of infectious diseases, experimental surgery, and problems of practical hygiene

may in many cases be attacked more directly, and without the risk of possible injustice or ill effect to human subjects, by utilizing monkeys or apes.

The medical is not my field of research. I write of it with consciousness of inadequate knowledge and with reservations which did not inhibit me in thinking of the possibilities of naturalistic, psychological, educational, and social research. Perhaps I should have omitted entirely this field of inquiry had not the French medical authorities given the most substantial practical endorsement to the hopes which I have expressed, by establishing, through the Pasteur Institute, in French Guinea, laboratories for medical research with the monkeys and apes.

Already our list of research opportunities is long, but it would be an inexcusable oversight or neglect to omit entirely those fields of work which have been most diligently and highly cultivated; namely, the morphological. It was natural enough—indeed, inevitable—that the external characteristics of the primates should attract and command scientific attention and should lead, because of their variety and variability, to systems of classification based upon voluminous descriptions of the distinguishing characters of families, genera, species, and varieties. Close on the heels of the taxonomist, as the classifier of animals is called, or even in his person, comes the student

of bodily structure—anatomist, histologist, embryologist, pathologist. By all of these investigators the remains of the primate, once psychologically and sociologically interesting, have been utilized. As a result there has grown up a body of information about the anatomy and development of various types of monkey and ape which is precious and the value of which will increase as observations are verified, supplemented, and comparisons extended. It is upon just such studies of primate structure and the resulting information that we base to-day our most important notions about organic development and evolution.

It has been said that our knowledge of primate morphology is more ample and more nearly complete than that of primate physiology, psychology, sociology. But even the structural sciences are rather at the beginning than at the end of their long quest. Consequently, if and when provisions are made for the more nearly adequate utilization of primates to extend our knowledge of life and its conditions, they should include instead of ignoring morphological work. They should also provide along with opportunities for the study of the animals in their natural habitat, or under equally good conditions of life in confinement, for the utilization of the animals whose lives have been spent and whose remains may thereupon further advance anthropology, anat-

omy, and the various other divisions of morphological inquiry. Thus, without neglecting the more backward fields of biological research, we might make the primates contribute increasingly to those subjects in which we to-day feel confident of the relative adequacy of our knowledge and on which we have possibly too largely rested our hypotheses, theories, or doctrines of development and evolution.

Increasing control of our environment and selves depends chiefly on the application of the methods of science to the study of ourselves and of the phenomena which condition our existence. Strange to say, we know relatively much more about our environment than about ourselves, and are able in far larger measure to control the conditions of life than life's processes and experiences. Although it is good to have knowledge of the physical world, and large ability to control it, it is correspondingly bad to be relatively ignorant of vital phenomena including behavior, social relations, and mental life. There is a lack of balance in our present knowledge which in certain directions threatens serious disaster. When we stop to ask, why we seek ever increasing knowledge and understanding of physical phenomena, why ever larger measure of control of the world in which we live, we readily admit that it is for the improvement of life itself.

Yet, as we ponder our situation, we discover that our ignorance of life makes it impossible for us to formulate objectives or ideals or to decide whither we should drive. It is possible, if not probable, that our astounding progress in the physical sciences, with its profound changes in the conditions of human life, may totally wreck our present more progressive civilizations or even destroy the race. Not a few organic types have appeared on this earth, prospered for an æon or two, and succumbed to environmental conditions for the existence of which their own activities may have been largely responsible. Possibly mankind is now headed toward such shaping of his environment as will prove destructive. But even though disaster be not imminent, it is clearly the part of wisdom to foster the development of the biological sciences as energetically and effectively as of the physical sciences. To know the conditions of life without knowing life itself must inevitably prove unsatisfactory.

Perhaps the most essential of all knowledge for the defining of human objectives and the wise conduct of life has to do with consciousness and experience. Of them we have only a certain remote superficial descriptive knowledge. We stand, as it were, before a locked door, trying persistently, thus far without success, to discover how to open it. With all our speculation about the nature of

consciousness, the laws of mental life, the relations of experience to bodily processes and to environmental events, we have come forward toward effective working knowledge but slightly during the period of human history.

The purpose of this comparison of the status of physical and biological sciences is to point the strategic value of the primates for psychological inquiry. Of all living creatures they are the most promising material for the psychologist, aside from his fellow beings. And where the fellow beings refuse to lead or follow, where experimentation is unjust or otherwise impracticable, the infrahuman primate is supreme. It is far worse than careless to ignore or neglect our opportunities; it is wholly inexcusable.

REFERENCE AND READING LIST

- 1 Sonntag, C. F. "The morphology and evolution of the apes and man." London, 1924, vi + 356 pp.
A summary account of the structure of apes as compared with that of man.
- 2 Forbes, H. O. "A hand-book of the primates." London, 1894, two volumes.
For the layman this is a very convenient and readable description of the monkeys and apes.
- 3 Elliott, D. G. "A review of the primates." New York, 1913 (Monograph 1 of the American Museum of Natural History), three volumes.
An authoritative work on the classification of the primates.
- 4 Kohts, Nadie. "Untersuchungen über die Erkenntnisfähigkeiten des Schimpansen." (In Russian.) Moscow, 1923, 453 pp. Accompanied by a German translation of the summary, 38 pp.
"Report of the Zoöpsychological Laboratory of the Darwinian Museum." (In Russian.) Moscow, 1921, 15 pp.
For those who read Russian, these are interesting reports of experiments with the chimpanzee.
- 5 Koehler, W. "Aus der Anthropoidenstation auf Teneriffa. II. Optische Untersuchungen am Schimpansen und am Haushuhn." (70 pp.)

Abh. d. Preuss. Akad., 1915, *Phys.-Math. Kl. Nr. 3.*

“Aus der Anthropoidenstation auf Teneriffa. IV. Nachweis einfacher Strukturfunktionen beim Schimpansen und beim Haushuhn über eine neue Methode zur Untersuchung des Bunten Farbensystems.” (101 pp.) *Abh. d. Preuss. Akad.*, 1918, *Phys.-Math. Kl. Nr. 2.*

Important reports of experimental studies of vision and perception in the chimpanzee and hen.

- 6 Koehler, W. “The mentality of apes.” Translated from the German by E. Winter. New York, 1925, 342 pp.

One of the most important books on the intelligence of the chimpanzee.

- 7 Boutan, L. “Le pseudo-language. Observations effectuées sur un anthropoïde : le gibbon (*Hylobates Leucogenys-Ogilby*).” *Actes de la Soc. Linnéenne de Bordeaux*, 1913, **67**, 5–80.

“Les deux méthodes de l’enfant.” *Actes de la Soc. Linnéenne de Bordeaux*, 1914, **68**, 146 pp.

Valuable studies of intelligence and vocal expression in the gibbon.

- 8 Yerkes, R. M. “The mental life of monkeys and apes: a study of ideational behavior.” *Behavior Monographs*, 1916, **3**, 156 pp.

An account of experiments on monkeys and an orangutan to discover whether they act ideationally.

- 9 Yerkes, R. M. and Learned, B. W. “Chimpanzee intelligence and its vocal expressions.” Baltimore, 1925, 157 pp.

REFERENCE AND READING LIST 277

Observations on two young chimpanzees, Chim and Panzee.

- 10 Akeley, C. E. "In brightest Africa." New York, 1923, xii + 267 pp.

This contains some new information about the mountain gorilla.

- 11 Bradley, Mary H. "On the gorilla trail." New York, 1922, 266 pp.

It is a highly interesting book which importantly supplements Mr. Akeley's description of the gorilla.

- 12 Cunningham, A. "A gorilla's life in civilization." *Bull. Zool. Soc. N. Y.*, 1921, **24**, 118-124.

The story of the little gorilla John Daniel.

- 13 Wallace, A. R. "The Malay Archipelago." London, 1869 (1st ed. two volumes); 1922 (17th ed.), xii + 493 pp.

An excellent description of the orang-utan in its native land. Readable and reliable.

- 14 Du Chaillu, P. B. "Explorations and adventures in equatorial Africa." London, 1861, xviii + 479 pp.

Interesting, among other reasons, for its description of the gorilla in its native haunts, but by many considered unreliable.

- 15 Brehm, A. E. "Tierleben." Leipzig, 1911-22 (4th ed.), thirteen volumes. The primates are described in the 13th volume.

Possibly the best popular description of the primates, including the anthropoid apes, which is available in any language. The third edition of this famous natural history is translated into English.

- 16 Garner, R. L. "Apes and monkeys: their life and language." Boston, 1900, xiii + 284 pp.

"Gorillas and chimpanzees." London, 1896, 271 pp.
Readable, and especially interesting as studies of speech in monkeys and apes. Not highly esteemed by professional students of animal behavior.

- 17 Romanes, G. J. "Mental evolution in man." New York, 1889, viii + 439 pp.

"Mental evolution in animals." London, 1883, 411 pp.

Although old, these are still useful books for the general as well as the professional reader.

- 18 Furness, W. H. "Observations on the mentality of chimpanzees and orang-utans." *Proc. Amer. Philos. Soc.* 1916, **55**, 281-290.

Cited chiefly because of its account of the learning of human words by great apes.

- 19 Montané, L. "Un chimpancé Cubano." *El Siglo*, 1915, **20**, 1-17.

"A Cuban chimpanzee." Translated from the Spanish by C. S. Rossy. *Jour. Anim. Behav.*, 1916, **6**, 330-333.

An account of the birth of the Cuban chimpanzee Anumá.

- 20 Fox, H. "Disease in captive wild mammals and birds." Philadelphia, 1923, 659 pp.

An exceptionally useful work for those who need to know about the diseases of captive animals.

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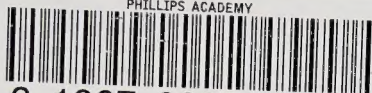
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